



WELCOME

VIRTUAL MEETING WILL BEGIN AT

11:30 AM Central

Society of American Military Engineers

Omaha Post

March 12th Meeting



Omaha Post Meeting

Society of American Military Engineers

Omaha Post

March 12th, 2024 Meeting

Meeting Agenda

- Pledge of Allegiance
- New Member/ Guest Introductions
- Invocation
- Lunch
- Announcements
- Membership Spotlight
- Presentation
- Q&A
- Split Kitty Drawing
- Closing Remarks

Pledge of Allegiance



I pledge allegiance to the Flag of the United States of America, and to the Republic for which it stands, one Nation under God, indivisible, with liberty and justice for all.

Introductions

Introductions

- Welcome SAME Student Chapter Members
- Welcome New SAME Members
- Introduction of Guests

Invocation

Please join us in the invocation before we dismiss for lunch

Lunch

Dismiss by table

Announcements

■ **Project Healing Waters Event**

- ▶ March 16th, 2024 @ Helleck Park (Papillion, NE)
- ▶ PHW helps active military service personnel and Veterans in need through a dedicated, developed curriculum of fly fishing, fly casting, fly tying, and fly rod building.

■ **USACE Missouri River Regional Event**

- ▶ March 21st, 2024 @ Orlando's Event Center (Maryland Heights, MO) - In-person and virtual attendance options will be available
- ▶ Topic: GA West and John Cochrane VA Hospital Project Updates

Announcements

- **April Membership Meeting**

- ▶ April 9th @ Field Club of Omaha
- ▶ Topic: Siemens – Applicable Federal Market Topics

- **The Black Hill Defense and Industry Symposium**

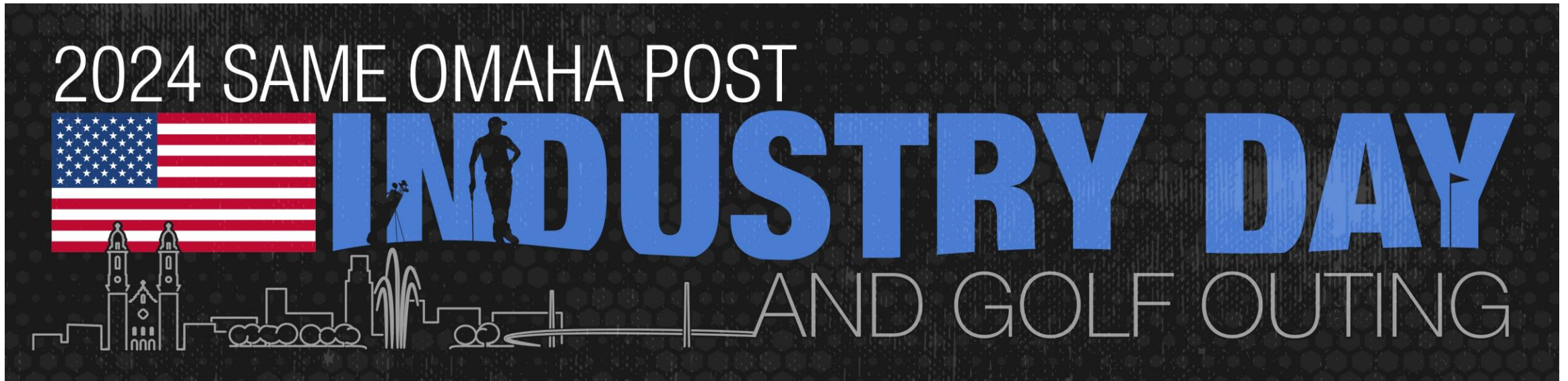
- ▶ April 10-11 @ The Box Elder Events Center (631 Watiki Way, Box Elder, SD 57719)

- **Meet the Buyers Lincoln**

- ▶ April 24th – 8 AM-3 PM with lunch provided @Nebraska Extension in Lancaster County (444 Cherry Creek Rd Suite A, Lincoln, NE 68528)

Announcements

- **Omaha Industry Days**
 - ▶ May 29th-May 31st, 2024 at CHI Center



THANK YOU!

- **SAME SMP** - Engineering Workshop 2024 event in partnership with the Society of American Military Engineers (SAME), Omaha Post STEM Program in Elkhorn, Nebraska.
 - ▶ The event focused on inspiring and educating over 100 middle and high school students about the many great careers available in the engineering and construction fields.



Membership Spotlight





IMEG Consultants Corp.

FIRM OVERVIEW/INTRODUCTION



SAME OMAHA POST
MARCH 12, 2024

105 COLLECTIVE YEARS

2,600 EMPLOYEES

U.S. BASED &
EMPLOYEE-OWNED

93 LOCATIONS

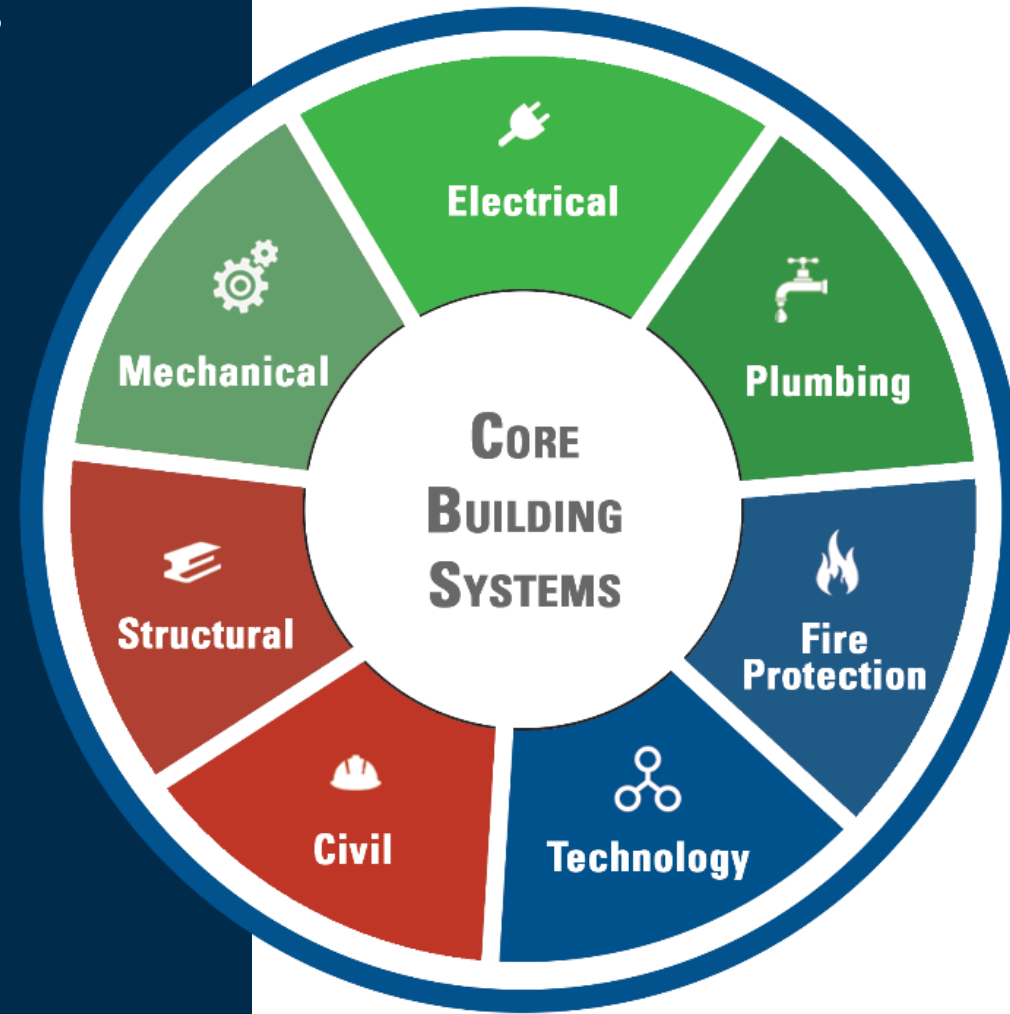
650+
LICENSED ENGINEERS

\$425M

IN ANNUAL REVENUE

#57 / TOP 500

DESIGN FIRM



BUILDING DESIGN: ENGINEERING & PLANNING

- Structural
- MEP / FP
- Technology Design
- Security Design & Engineering
- Acoustics & Noise Control
- Architectural Lighting
- Medical Equipment Planning
- Parking Design & Planning

SUSTAINABILITY & ENERGY SOLUTIONS

- Energy Modeling
- Decarbonization Analysis
- Life-cycle Cost Analysis
- Embodied Carbon Analysis
- LEED & WELL Consulting

BUILDING PERFORMANCE

- Commissioning / Retro-Commissioning
- Monitored-based Commissioning
- Building Performance Optimization

CONSULTING & ADVISORY SERVICES

- Building Intelligence & Integration
- Technology Advisory Services
- Healthcare Information Technology
- Security Consulting

INFRASTRUCTURE: DESIGN & PLANNING

- Civil Engineering
- Land Development & Surveying
- Environmental Services
- Landscape Architecture
- Materials Testing
- Construction Observation

PROCESS ENGINEERING

- Automation & Controls
- Chemical Process
- Bulk Processing

IMEG At-a-Glance



Local Knowledge with National Experience

Office Locations



Top 20

FEDERAL GOVERNMENT SECTOR ENGINEERING FIRM IN U.S.

- **30+** Year History Supporting Federal Projects
- Supporting **Civilian** and **Military Agencies** Nationwide and Internationally
- **3,800+** Projects Completed
- **DB and DBB Experience** on projects of varying size and complexity

Federal Portfolio Overview



Smithsonian National Museum of African American History and Culture, Washington, DC



Federal Project Highlights Firm-Wide





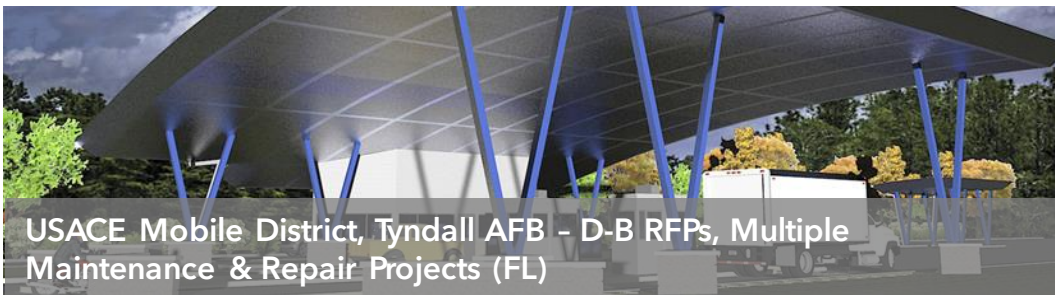
USACE Omaha District, Buckley SFB - Space Based Infrared System (SBIRS) Operations Support Facility (CO)



NAVFAC SE - BEQ, Corry "A" School (FL)



Marine Forces Reserves - MARFORRES Headquarters (LA)



USACE Mobile District, Tyndall AFB - D-B RFPs, Multiple Maintenance & Repair Projects (FL)



NAVFAC SE - Powertrain Transmission Preassembly and CEP (Phases 1-5) (TX)

Federal Project Highlights Firm-Wide



National
Science
Foundation
Antarctic
Infrastructure
Modernization

McMurdo Station,
Antarctica

- 250,000 SF Mixed-Use Campus
- Challenging Weather & Terrain



GSA New Land
Port of Entry
Columbus, NM

- 1,000,000 SF+ (site)
- 35,468 SF (main building)
- \$68M
- LEED Platinum Certified



DHS New
National Bio-
and Agro-
Defense Facility
Manhattan, KS

- 574,000 SF
- \$1.25B
- Research Facility Housing BSL-2, -3, -3Ag, and -4 Labs



DoE Argonne
National
Laboratory New
Materials Design
Lab

- Argonne, IL
- 120,000 SF
 - \$70M
 - LEED Gold Certified
 - Wet & Dry Labs



200+ LEED AP's

425+ TOTAL 3rd PARTY PROJECTS CERTIFIED

35 LEED PLATINUM certified/pursuing

137 LEED GOLD certified/pursuing

9 WELL BUILDING certified/pursuing

15 DESIGNED FOR NET ZERO ENERGY

25 ENERGY STAR

Sustainable Design

**MEP
2040**

Committing to Zero

SE2050
COMMITTING TO ZERO

ADOPTER
architecture
2030
CHALLENGE



Hyatt Hotels Corporate Headquarters | 240,000-sf Build-out – LEED Platinum & WELL Certification



➤ **Building Performance & Sustainability**

- Building Performance Optimization
- Building Performance Analysis
- Decarbonization
- Sustainable Designs (LEED, Green Globes, Net Zero, etc.)

➤ **Intelligent Building Design & Data Analytics**

- Technology Infrastructure Design, Systems Integration, Analytics/AI

➤ **IT Advisory Services**

➤ **Security Consulting**



➤ **Market-Sector Expertise**

- Team structure focused on niche experience.

➤ **Thought Leadership**

- Culture of learning and sharing our knowledge in the industry

➤ **Growth Oriented**

- Organic and acquired growth extends our expertise and outreach

➤ **Sustainable Design Solutions**

- High-performance design with many “firsts” in sustainable design

➤ **Proactive Design Partners**

- Extensive client relationships in the key markets we serve

Key Differentiators

USAFA Chapel Project Update and Laser Scanning Overview

Parker Burns
Project Manager, JE Dunn

Nathan Barnes
Computation Lead – R&D, Zahner



100 YEARS

ZAHNER

USAFA Cadet Chapel Repairs

Project Update & Laser Scanning

Parker Burns - JE Dunn,
and Nathan Barnes - Zahner

Introduction / History

- Opened to the public in 1963
- Named a U.S. National Historic Landmark in 2004
- Designed by Walter Netsch of Skidmore, Owings & Merrill (SOM)
- Envelope is comprised of 17 aluminum spires, two curtain walls, stained glass strip windows, and pie windows.
- Renovation project started in 2019.

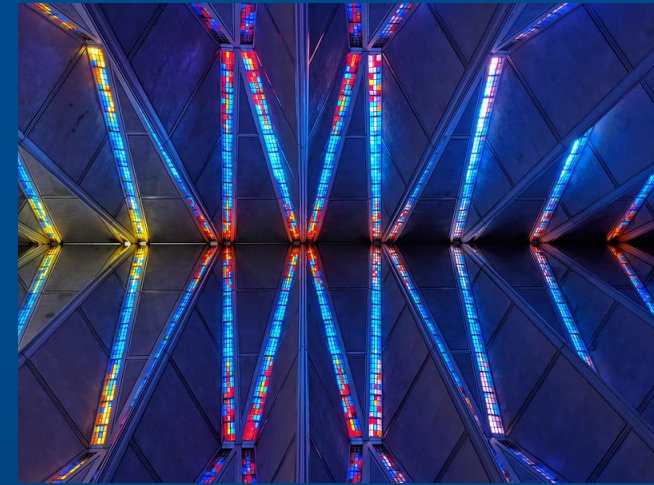


HISTORIC RENOVATIONS



Pipe Organ

A.E. Schlueter – Lithonia, GA



Stained Glass

Judson Studios – Pasadena, CA



Pews

Woodwork Restoration – Naples, FL

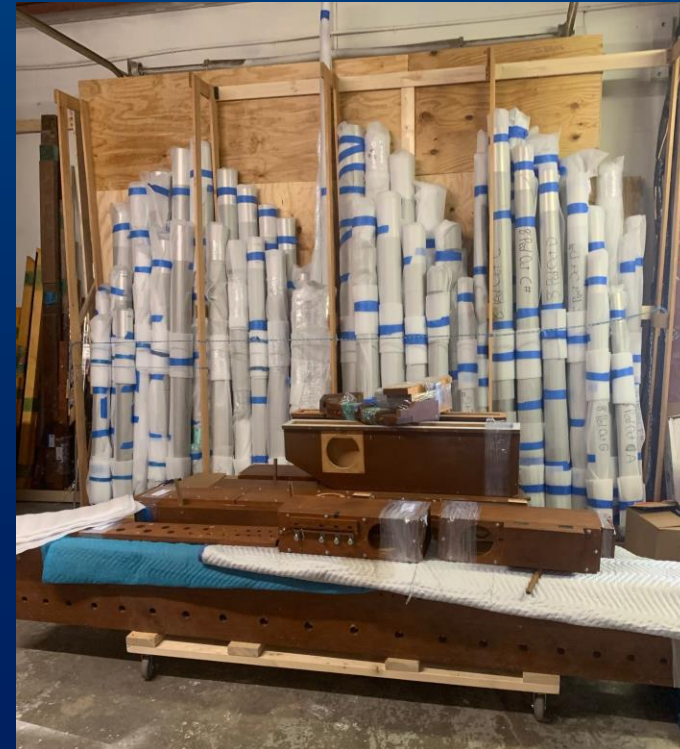
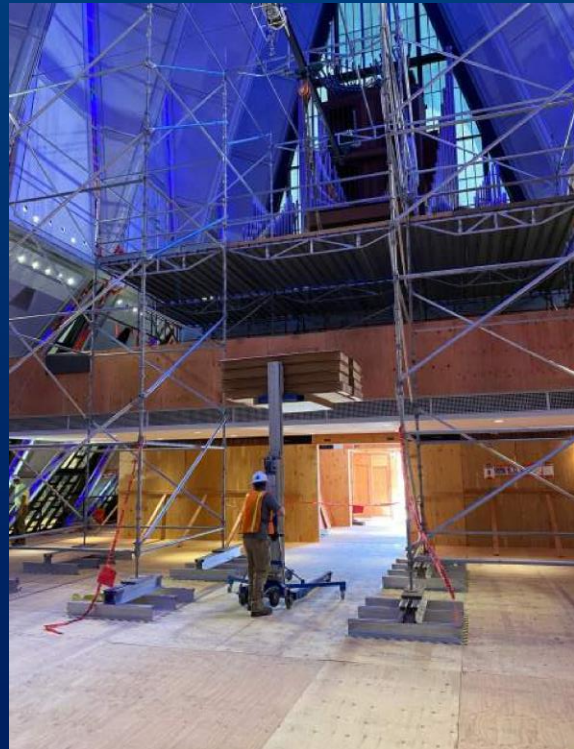
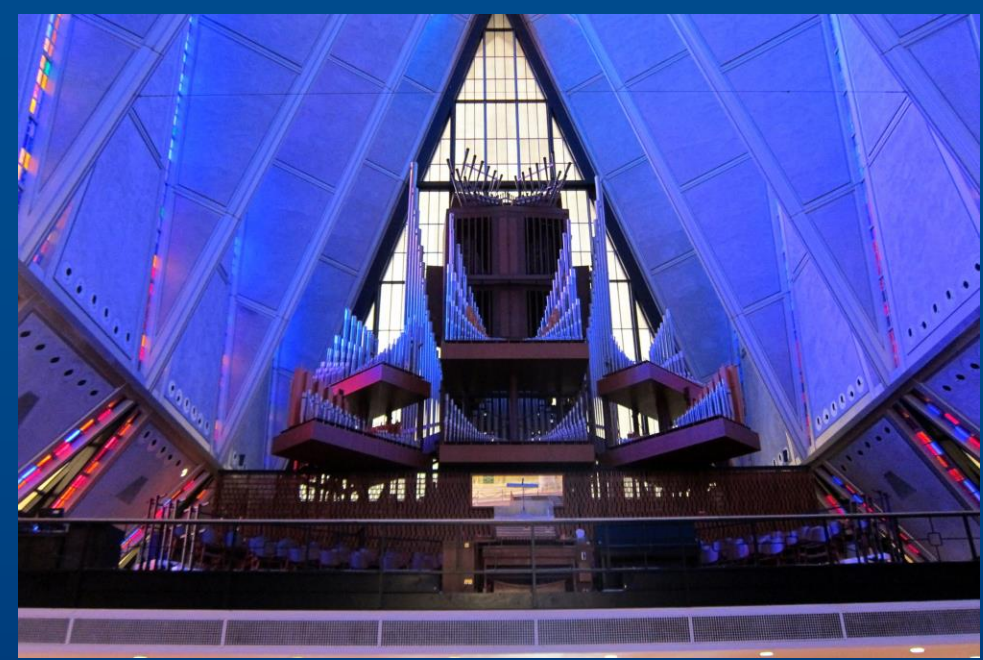


Envelope Material Matching

A.Zahner – Kansas City, MO, Alliance Glazing Technologies – Denver, CO

Pipe Organ – Scope & Update

- 4,518 – Pipe Protestant Pipe Organ
- 1,950 – Pipe Catholic Organ



Stained Glass – Scope & Update

- 2,240 cassettes – 24,384 pieces of glass
- Were able to reuse/repair all glass

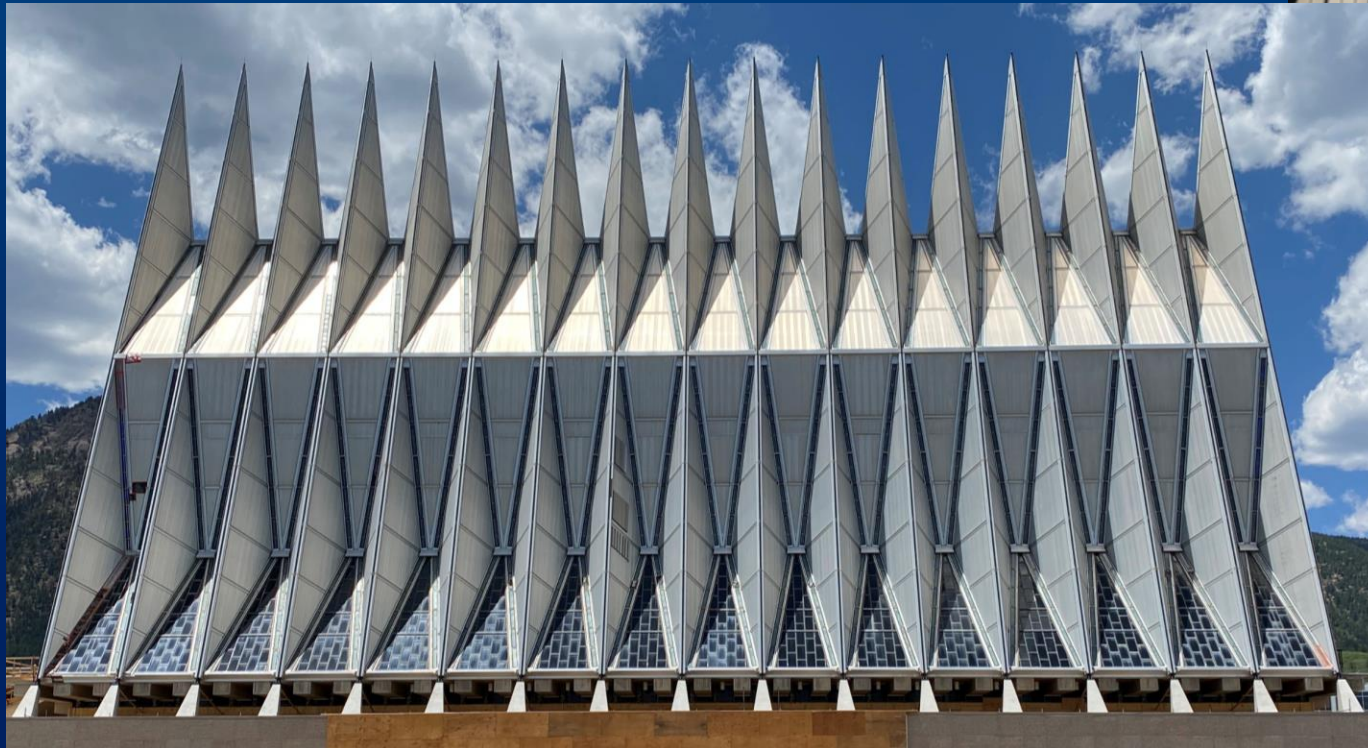
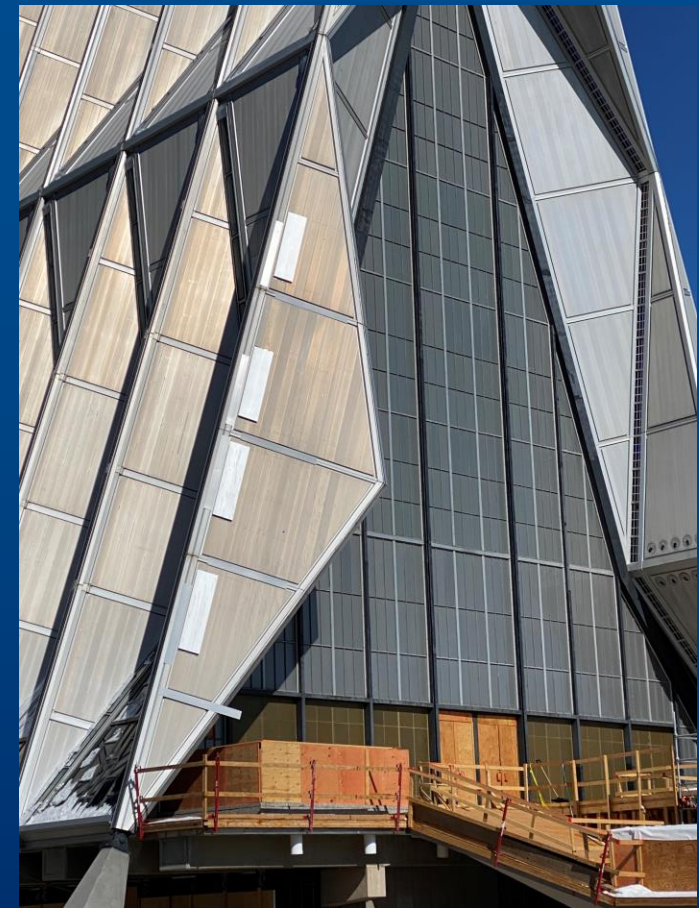


Pews – Scope & Update



Materials Matching – Scope & Update

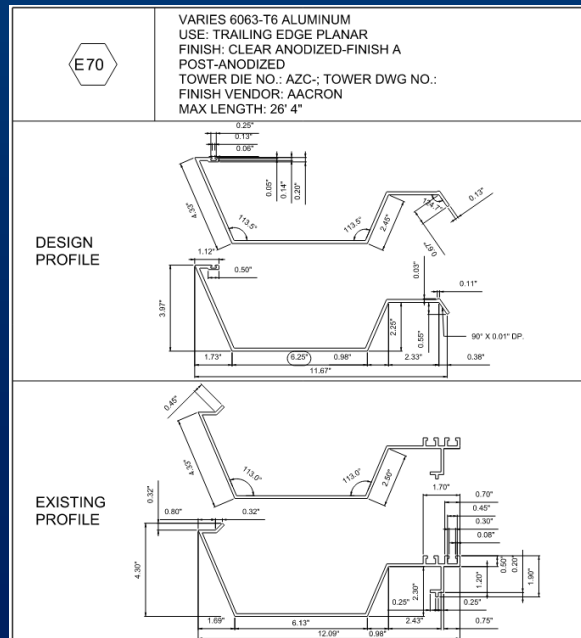
- Caustic Etch Panels
- Anodized Trim
- South Curtain Wall Silver Glass
- North Curtain Wall Tints



Aesthetic & Extrusion Matching

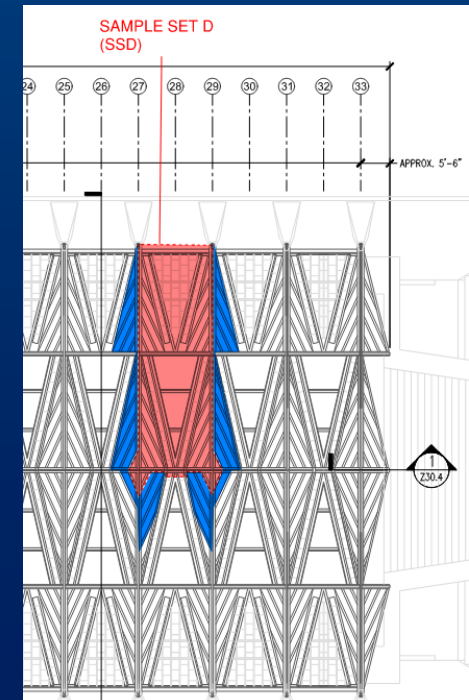
- Overall Laser Scan
- Select Demo and Measuring
- Dye Comparison & Approval
- Structural Scanning
- Historic Architect, NPS, and SHPO Review

Cadet Chapel Repairs - Existing Extrusions Removed at Zahner Post Measurement and Drawing Development



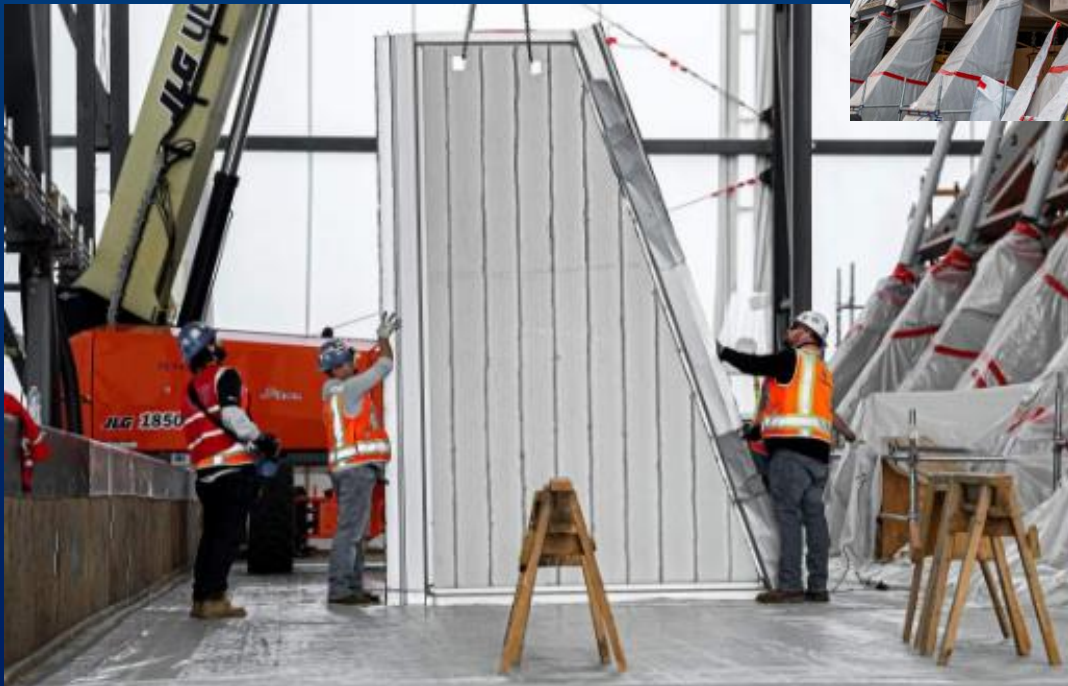
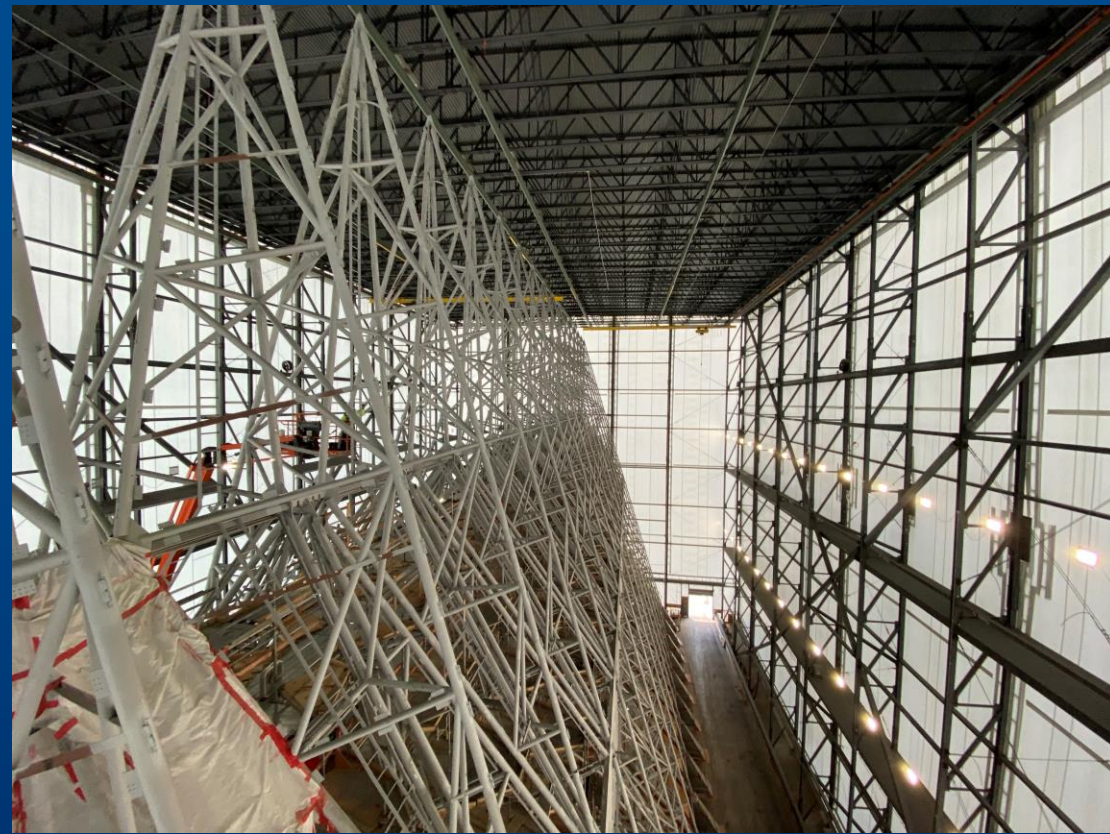
Sample Sets & Mockups

- Sample Set A – Individual Pieces
- Sample Set B – Full Scale Aesthetic Mockup
- Sample Set C - First Fabrication Inspections
- Sample Set D – Initial Install



Demo Progress

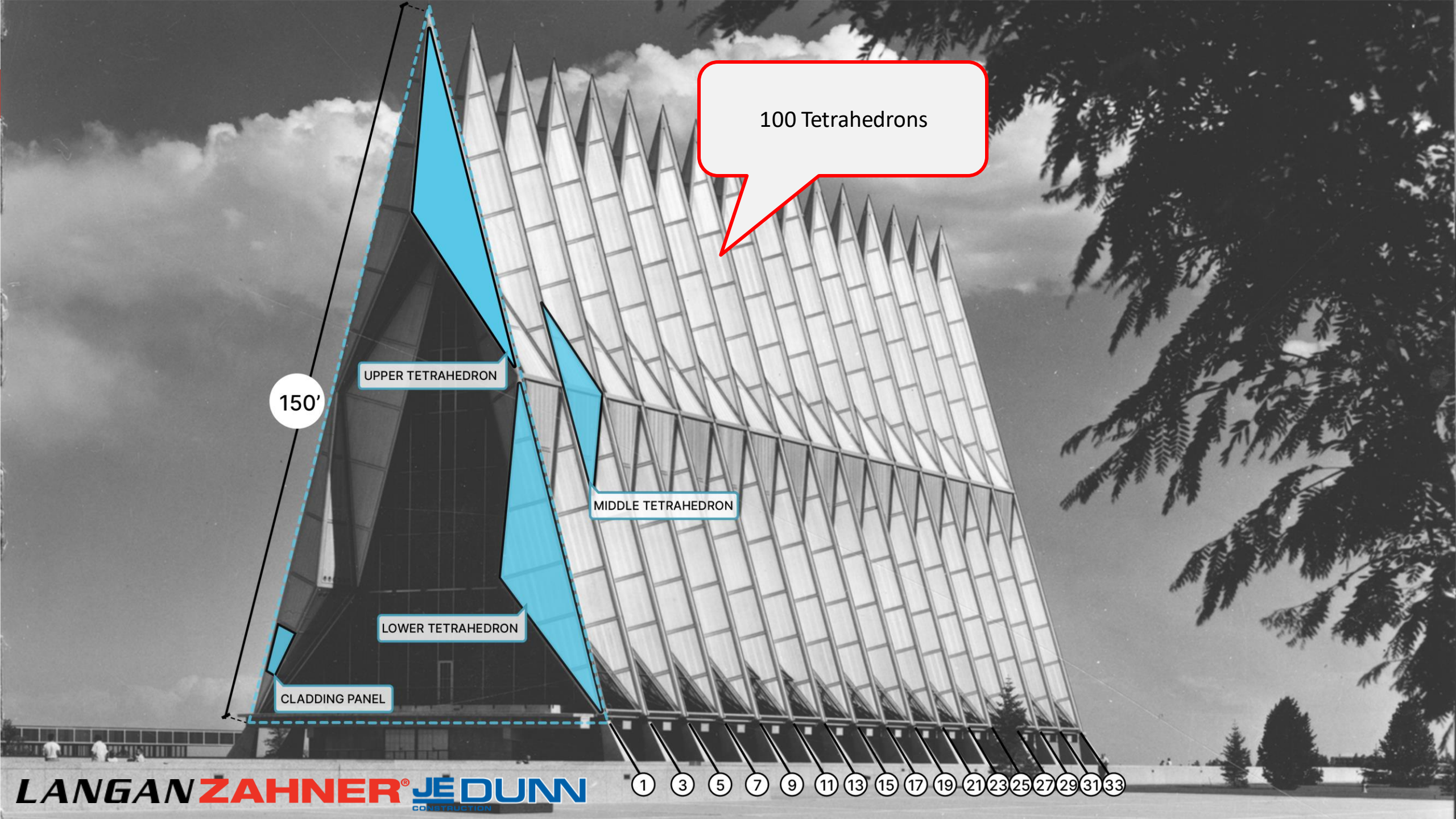
- Abatement Complete
- Panels Removed
- Glazing Removed
- Blasting



Construction Progress

- Intumescent Paint
- Electrical Work
- Curtain Wall High Performance Coatings
- Anchor Install (Window and Pipe Anchors)
- Sample Set D
- Fabrication





100 Tetrahedrons

150'

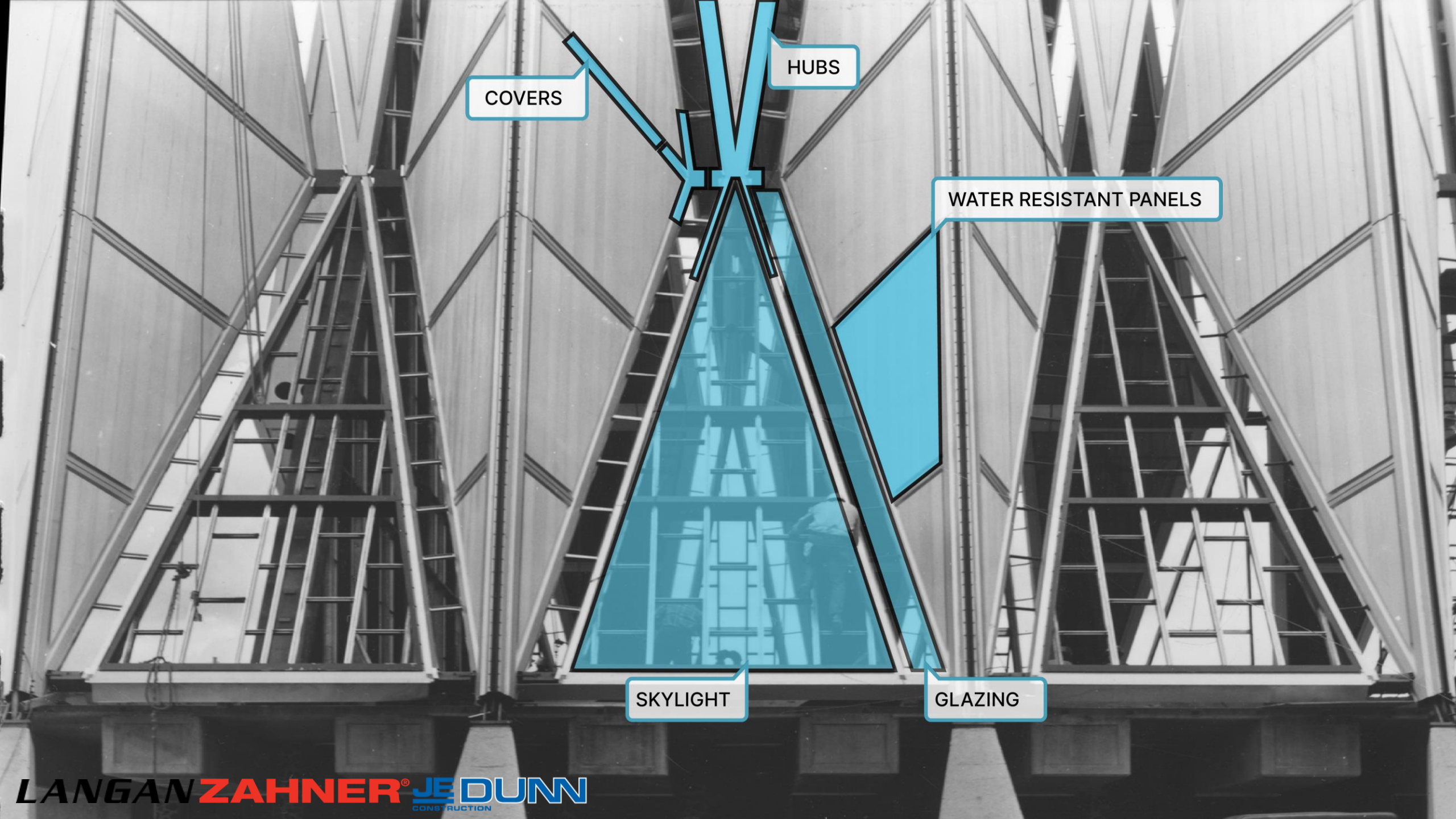
UPPER TETRAHEDRON

MIDDLE TETRAHEDRON

LOWER TETRAHEDRON

CLADDING PANEL

- 1
- 3
- 5
- 7
- 9
- 11
- 13
- 15
- 17
- 19
- 21
- 23
- 25
- 27
- 29
- 31
- 33



COVERS

HUBS

WATER RESISTANT PANELS

SKYLIGHT

GLAZING

DIRECT DELIVERY OF POSE



Human-Robot Workflows
in the Shop & Field



ROBOT-ASSISTED
WELDING

SURVEYLINK



DIRECT DELIVERY OF POSE

(SHOP & FIELD DIRECTIVES)
INFORMATION TRANSLATION

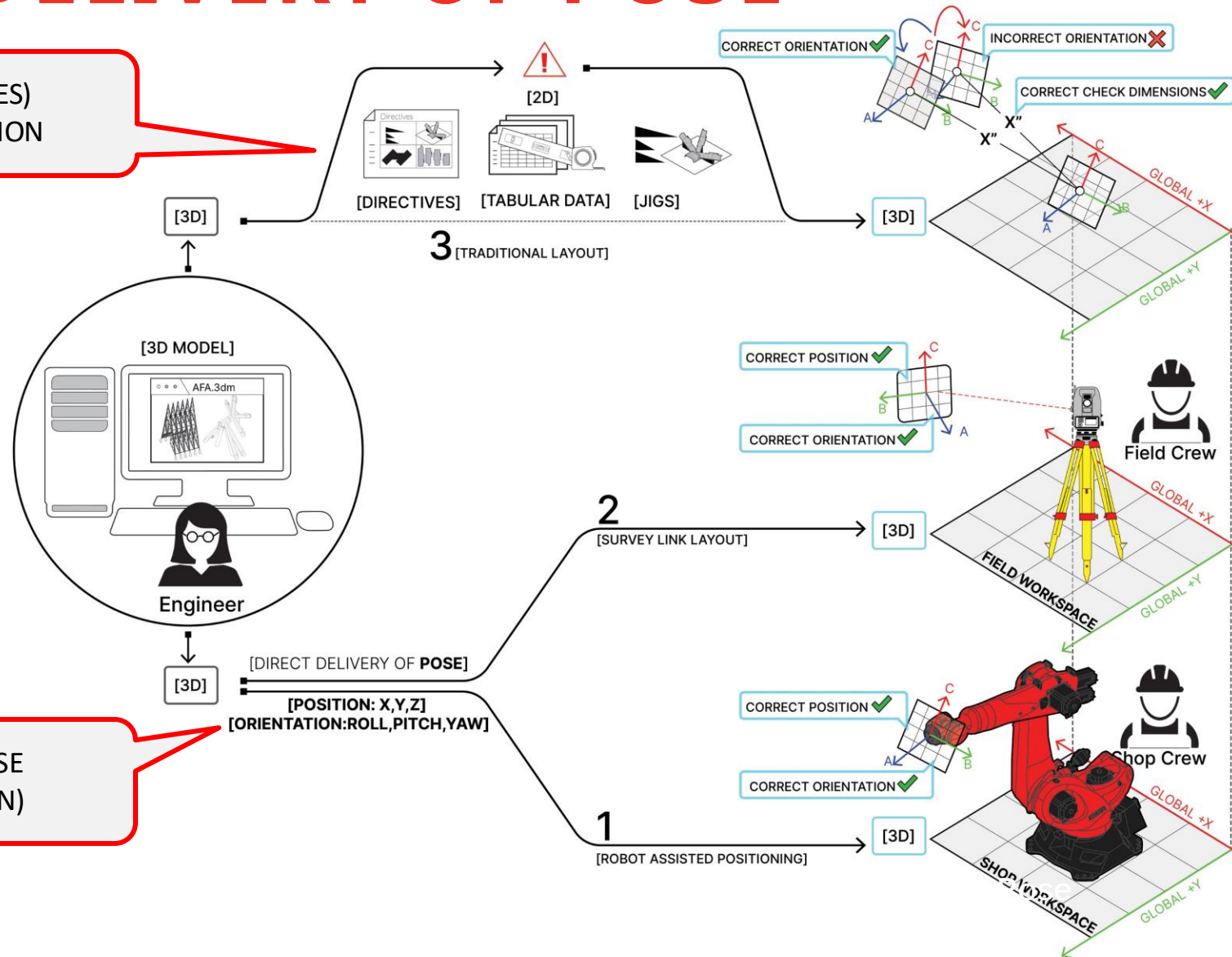
TYPICAL WORKFLOW

SURVEYLINK

ROBOT-ASSISTED
WELDING

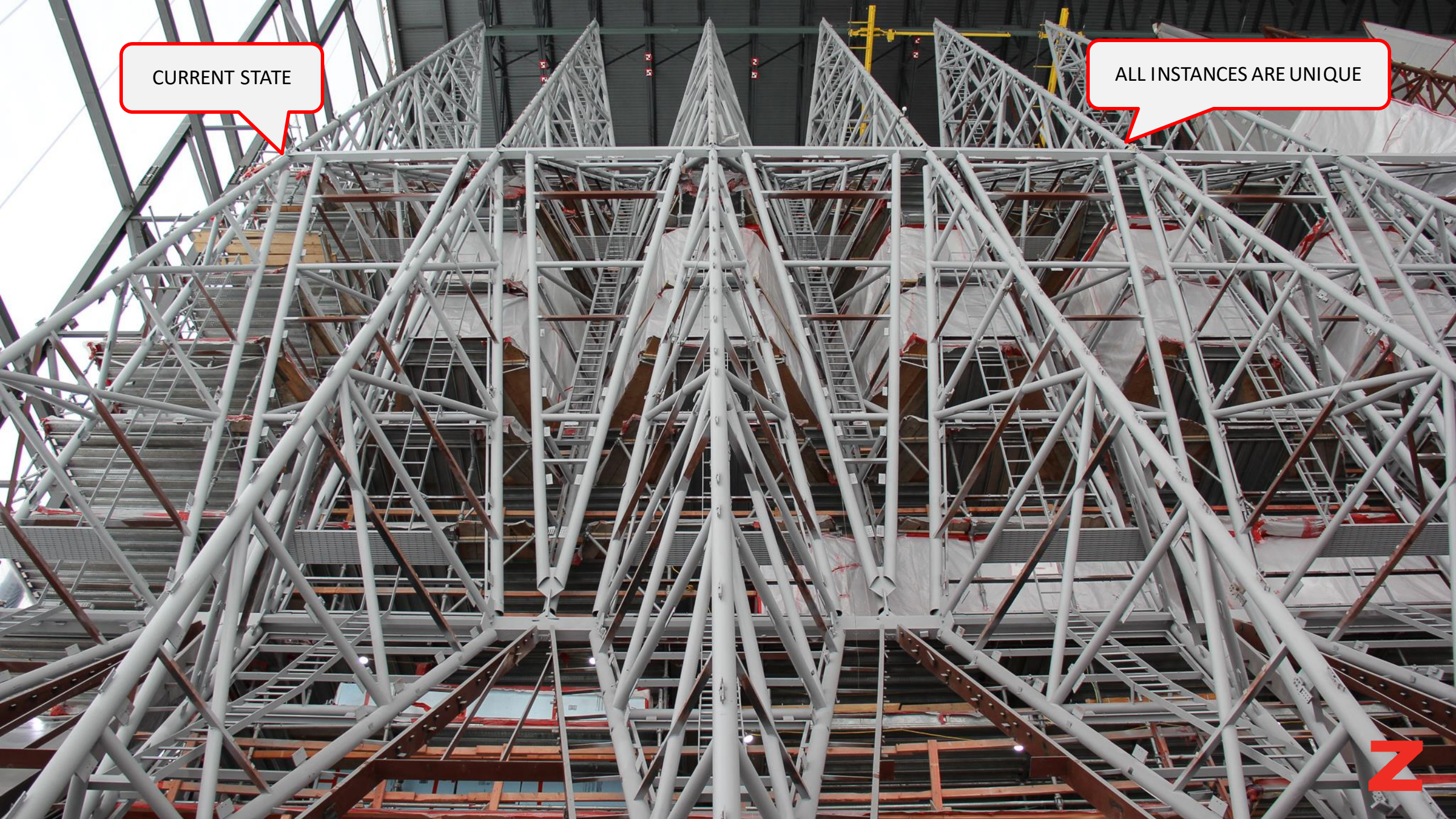
DIRECT DELIVERY OF POSE
(POSITION & ORIENTATION)

Direct Delivery of Pose

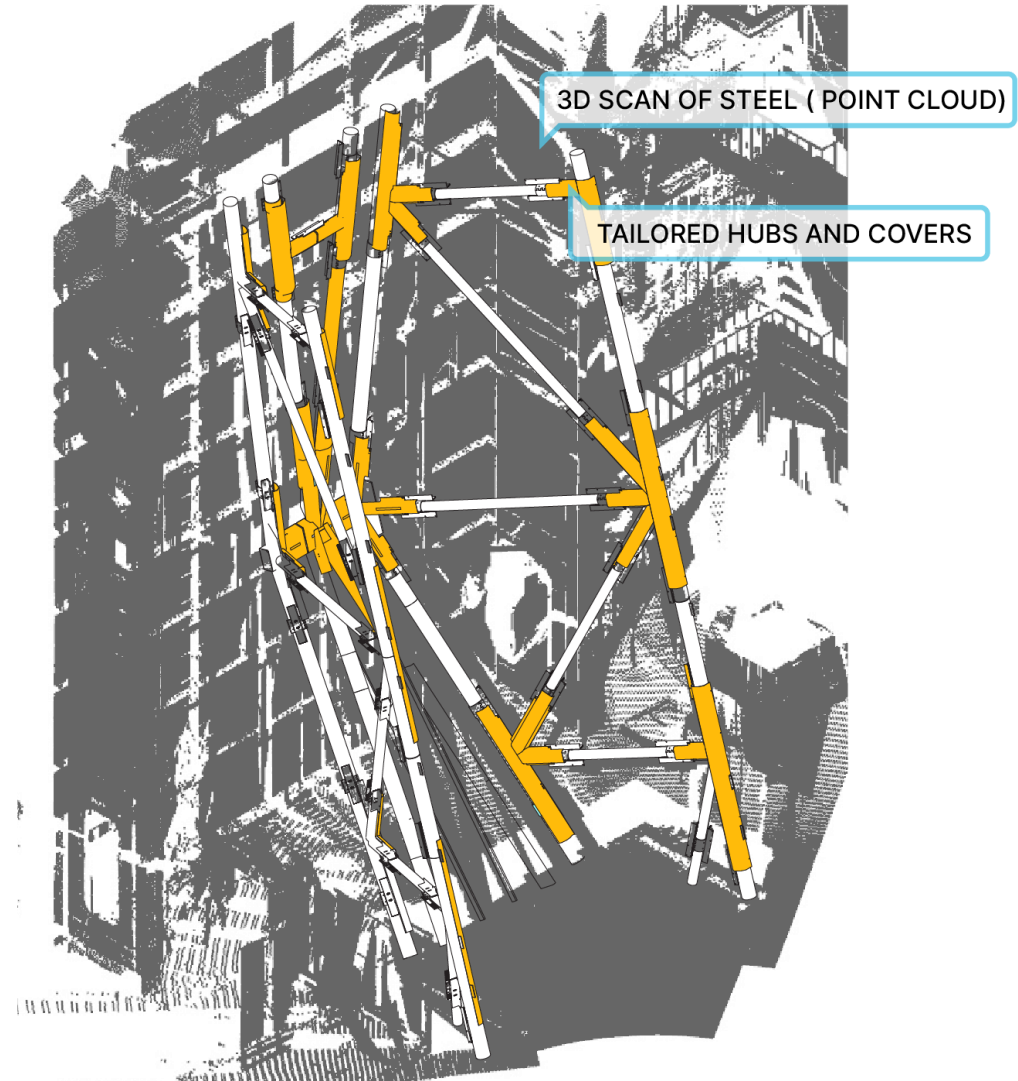
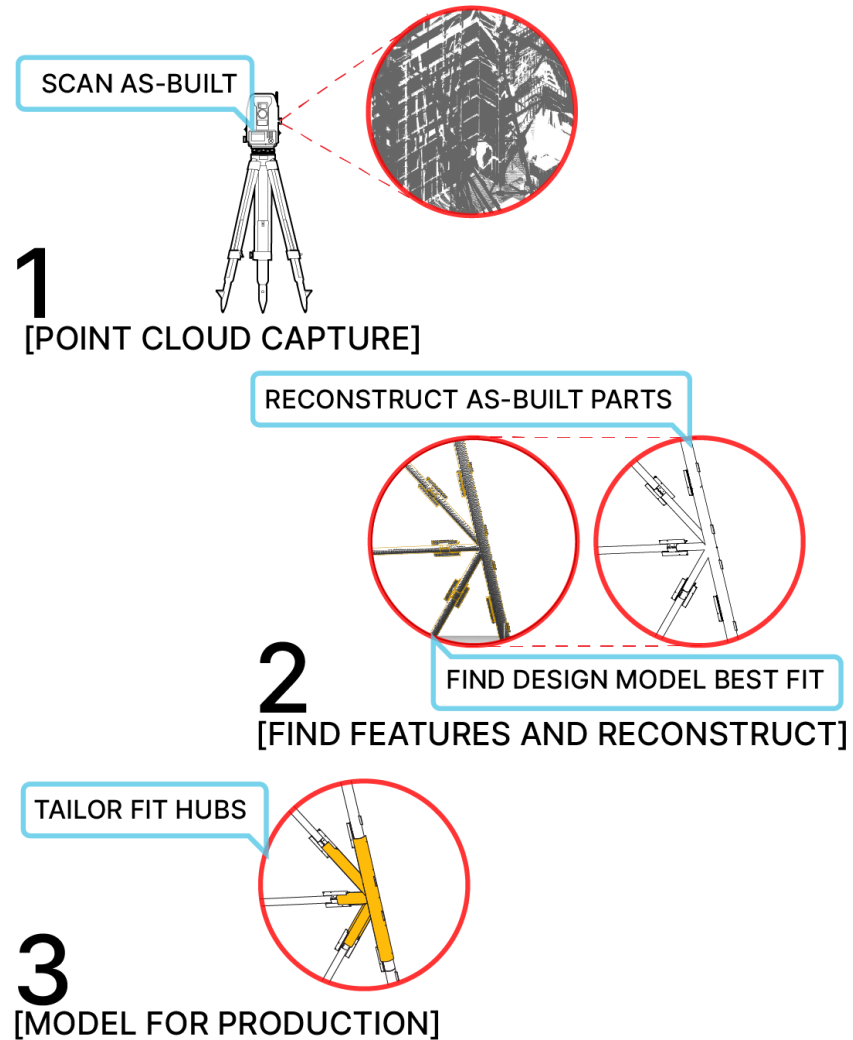


CURRENT STATE

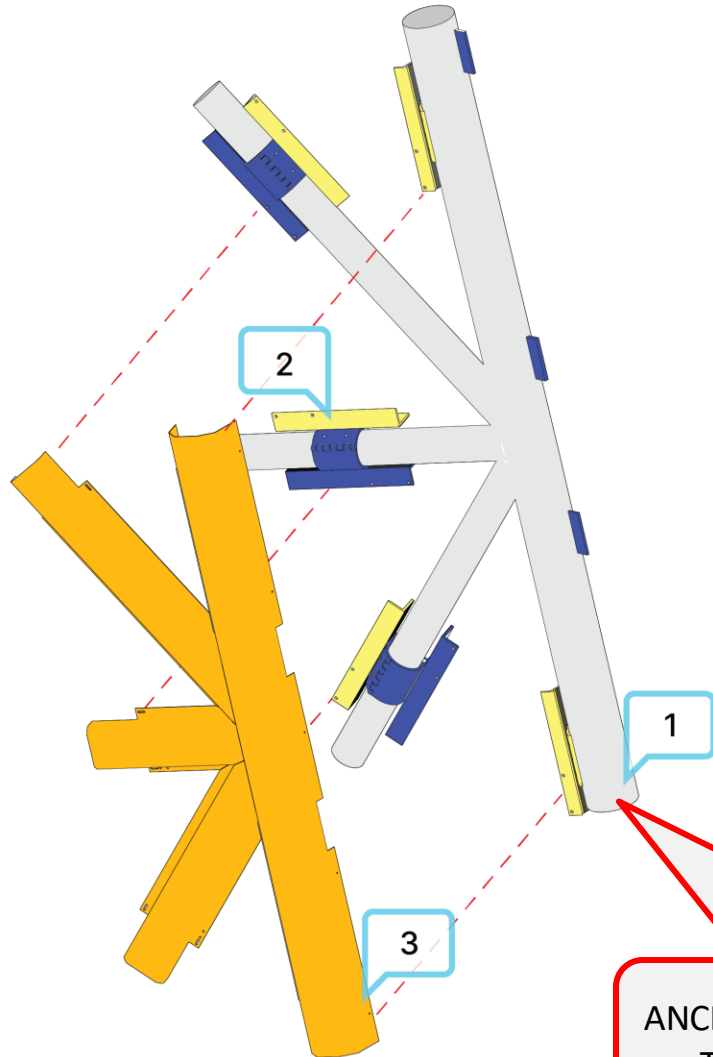
ALL INSTANCES ARE UNIQUE



RECONSTRUCT AS-BUILT MODEL



SCAN TO 3D PARTS



1

EXISTING STRUCTURAL STEEL

- SCANNED WITH THE SURVEY EQUIPMENT

2

ANCHORS: HUB ATTACHMENT POINTS TO STRUCTURAL STEEL

- POSITIONED ON STRUCTURAL STEEL WITH SL METHOD

3

HUBS: WATER SHEDDING COVERS FOR STRUCTURE

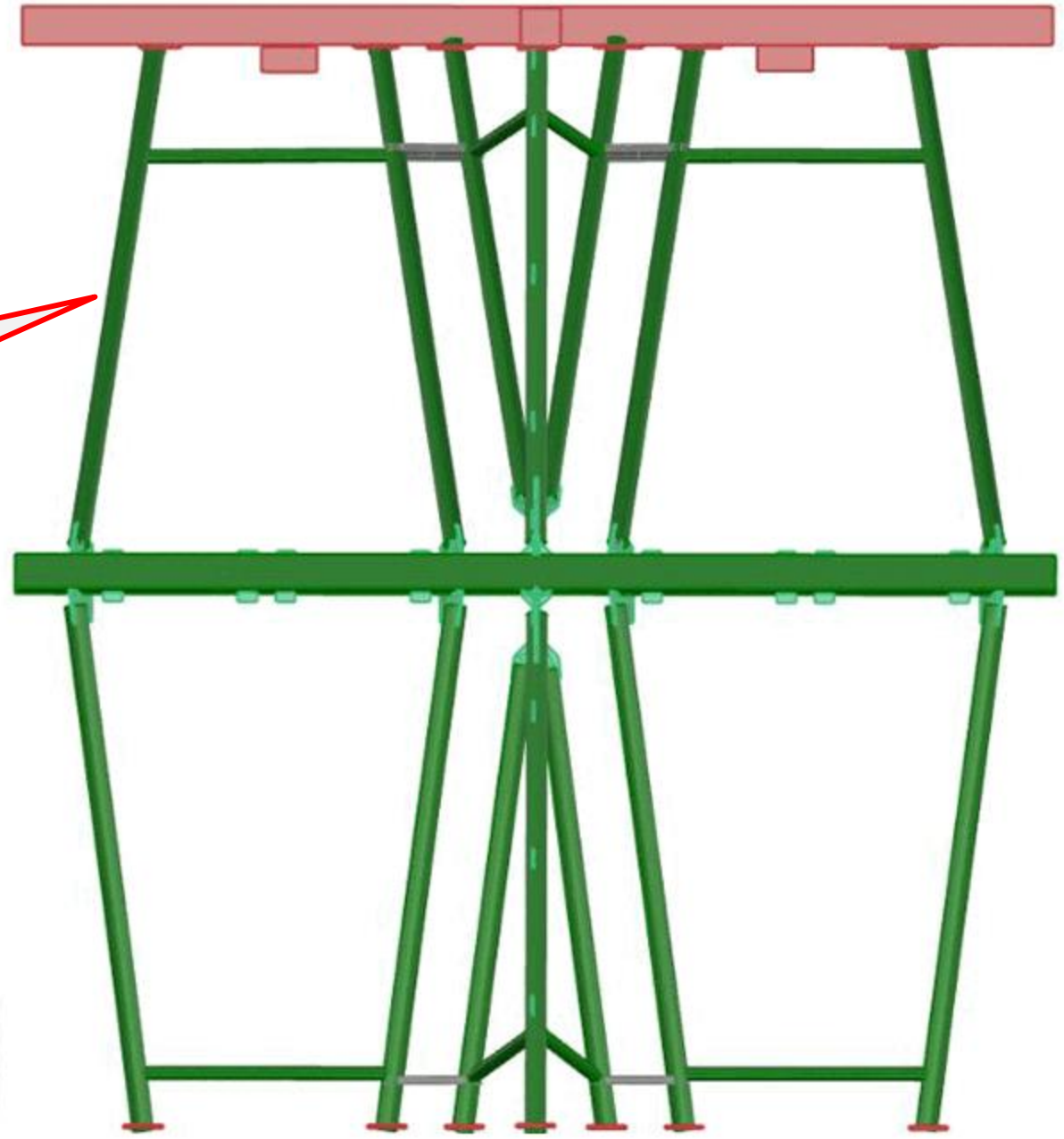
- LASER CUT, BRAKE FORMED, WELDED WITH RAW METHOD

ANCHORS AND HUBS ARE MODELED BASED ON
THE 3D SCAN OF EXISTING CONDITIONS

SCOPE

WRP, CLADDING PANELS AND CLADDING TRIM IS MODELED NEXT

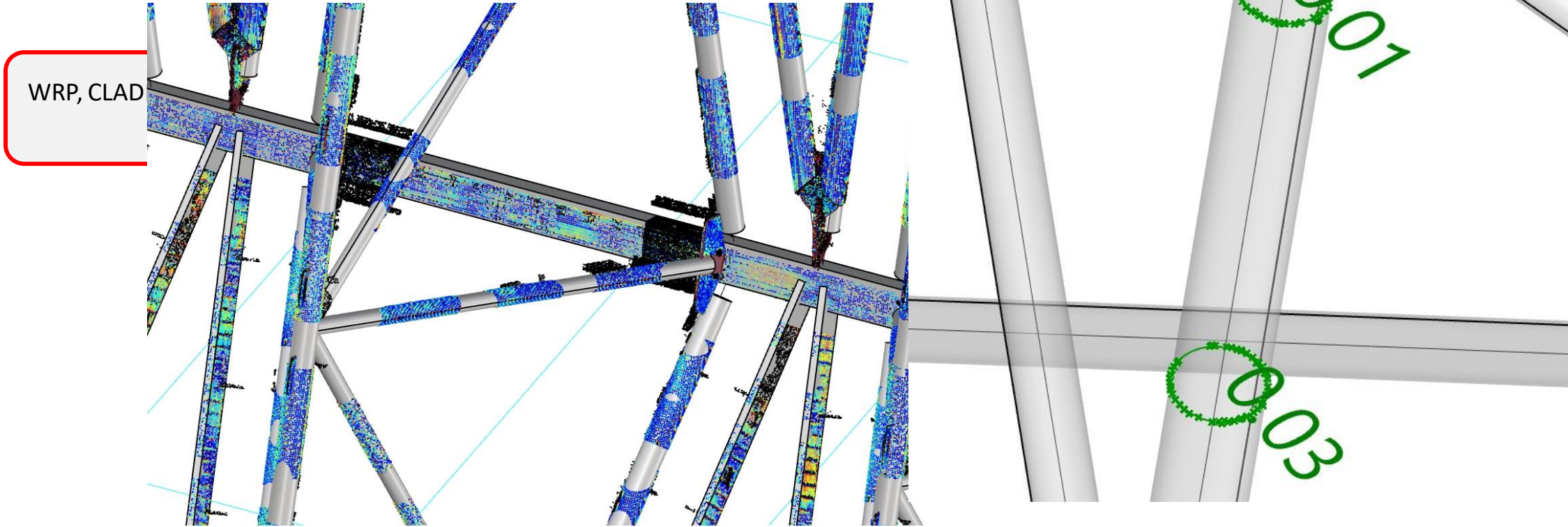
STEEL



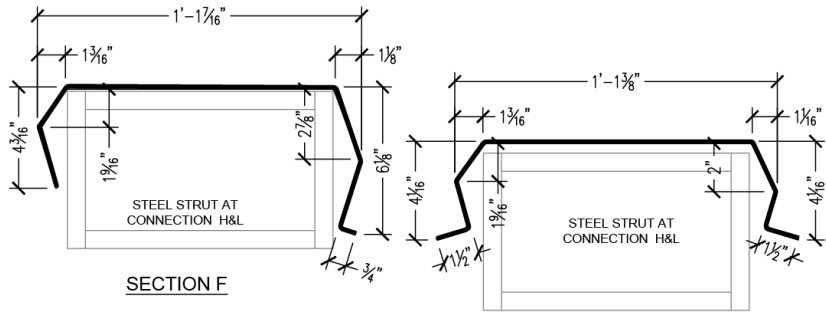
OVERALL SCOPE



POINT CLOUD

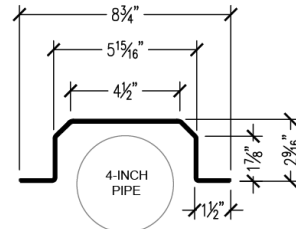


HUBS AND COVERS

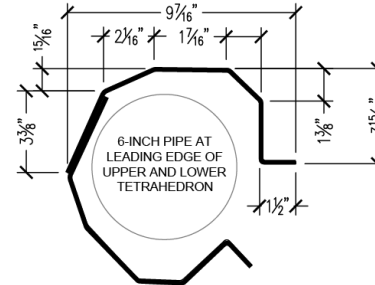


SECTION F

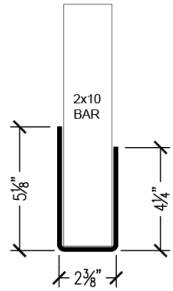
SECTION F1



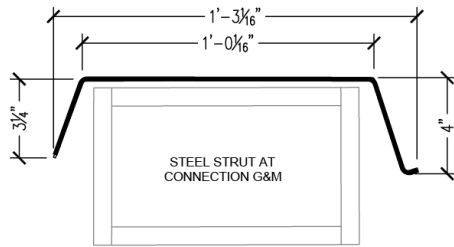
SECTION A



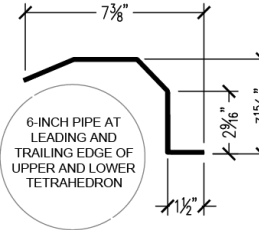
SECTION B



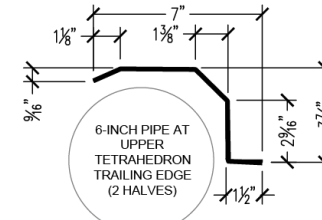
SECTION G



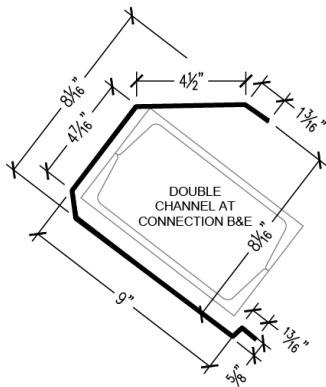
SECTION H



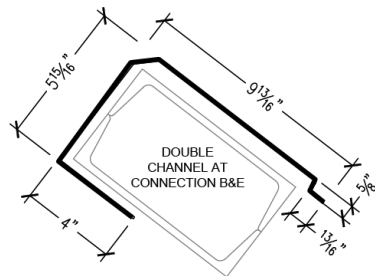
SECTION C



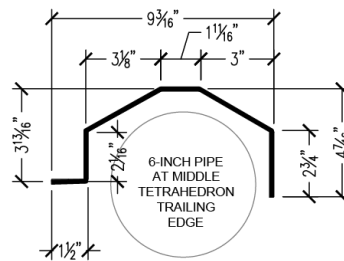
SECTION C1



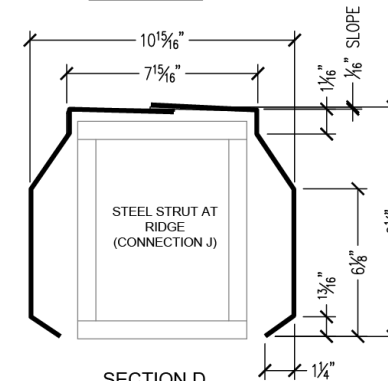
SECTION K



SECTION L



SECTION E



SECTION D

A Finite Number of Profiles

Unique Lengths and Part-to-Part Relationships

~9,880 Hubs and Cover Profiles

~5,200 Hubs and Covers

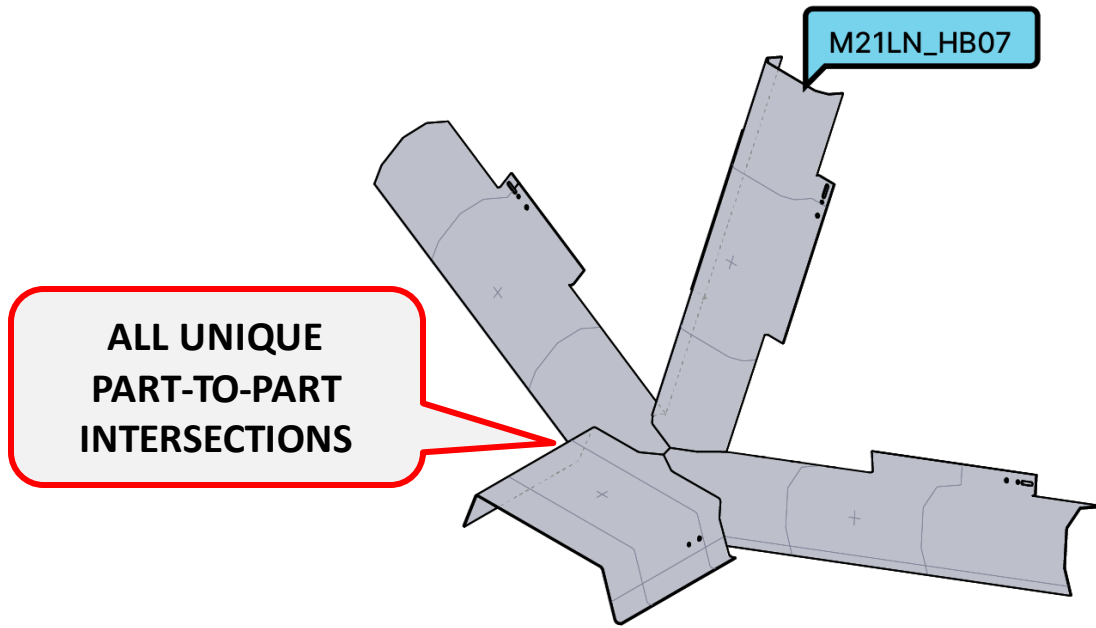
~3,500 Covers

~1,200 2D Hubs

~400 3D Hubs

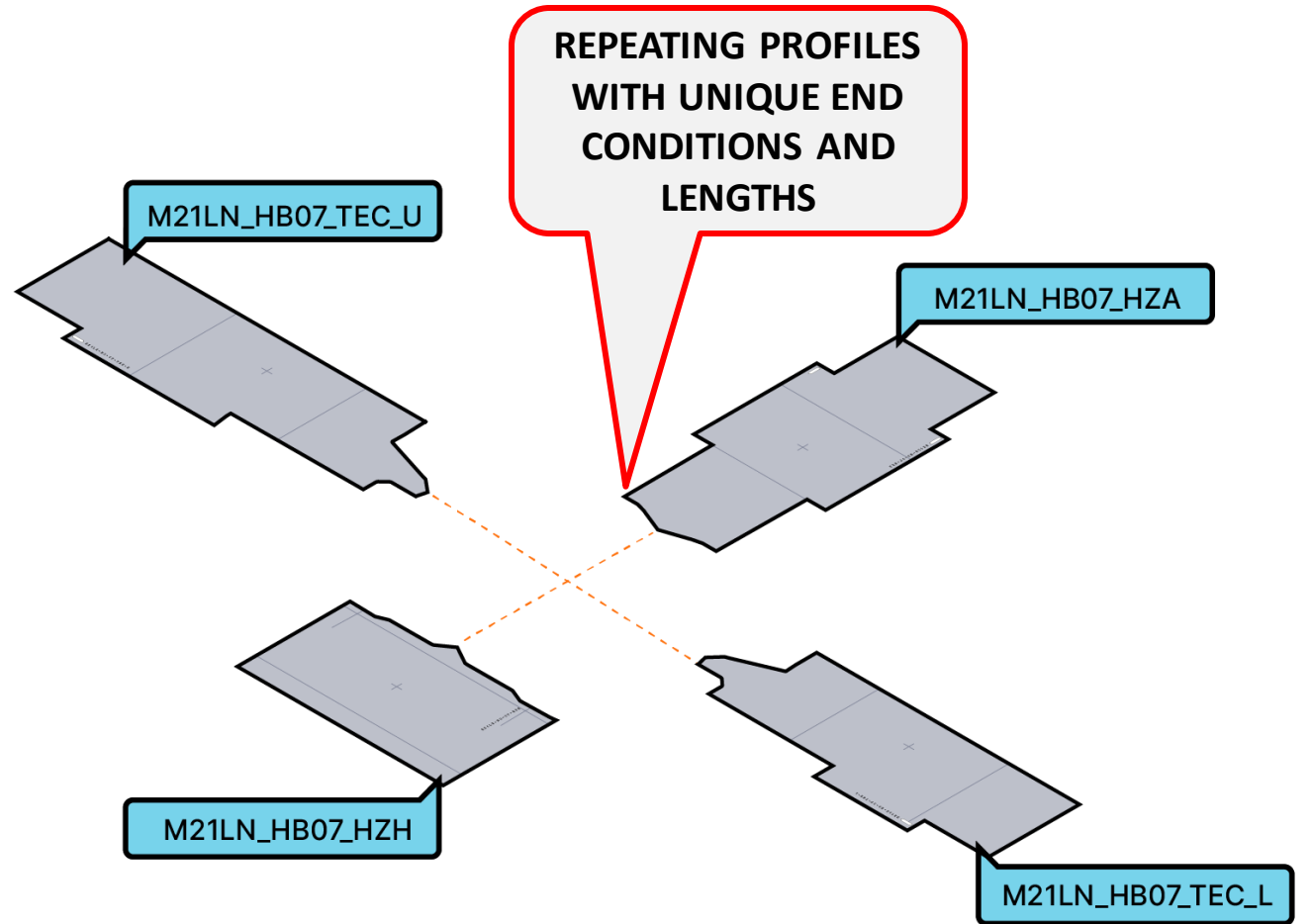


HUBS AND COVERS



1
[3D HUB]

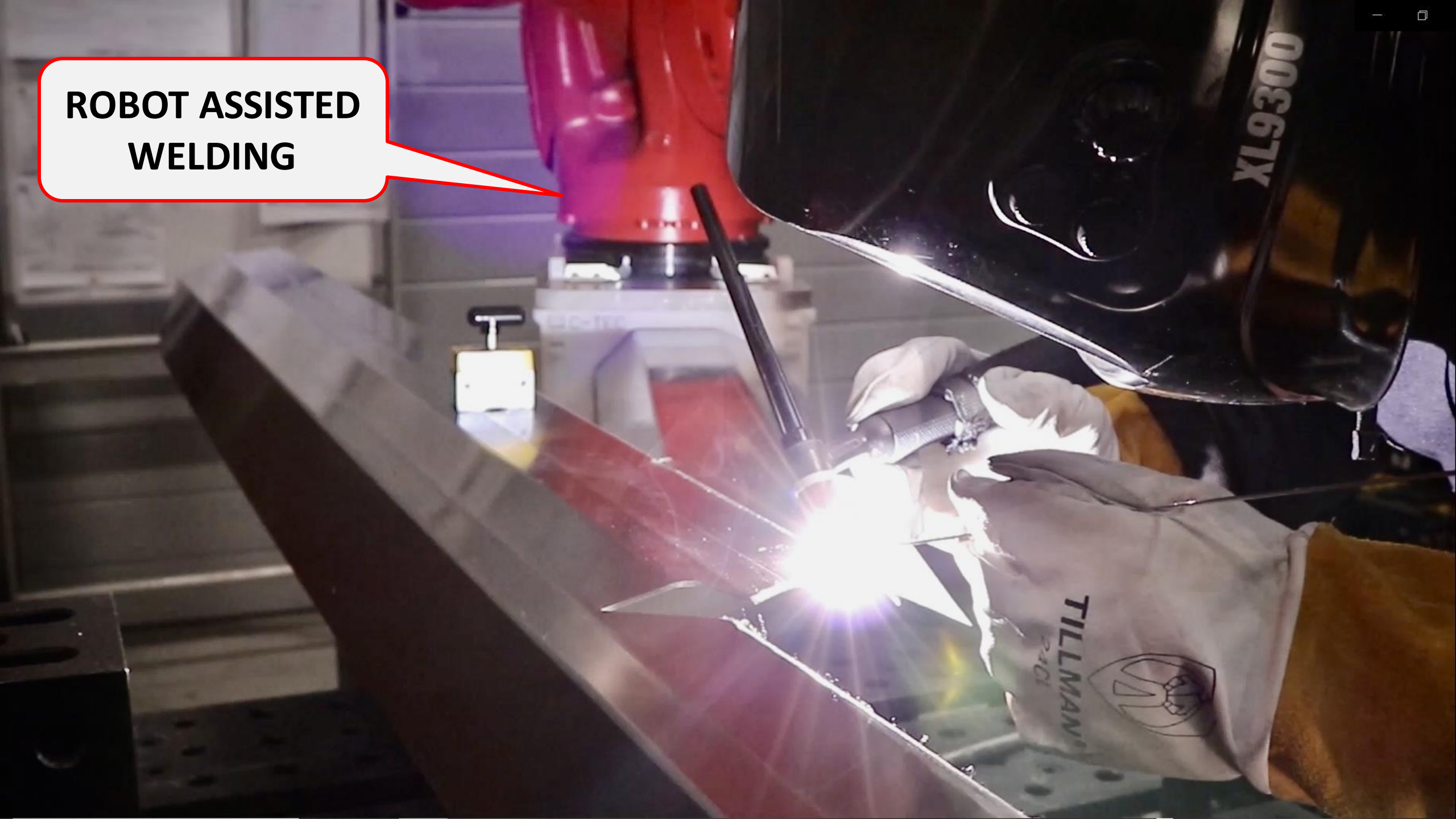
MODELED TO TAILOR FIT 3D SCANNED STEEL MODEL



2
[UNFOLD HUB PARTS]

PREPARED TO SEND OUT FOR PRODUCTION

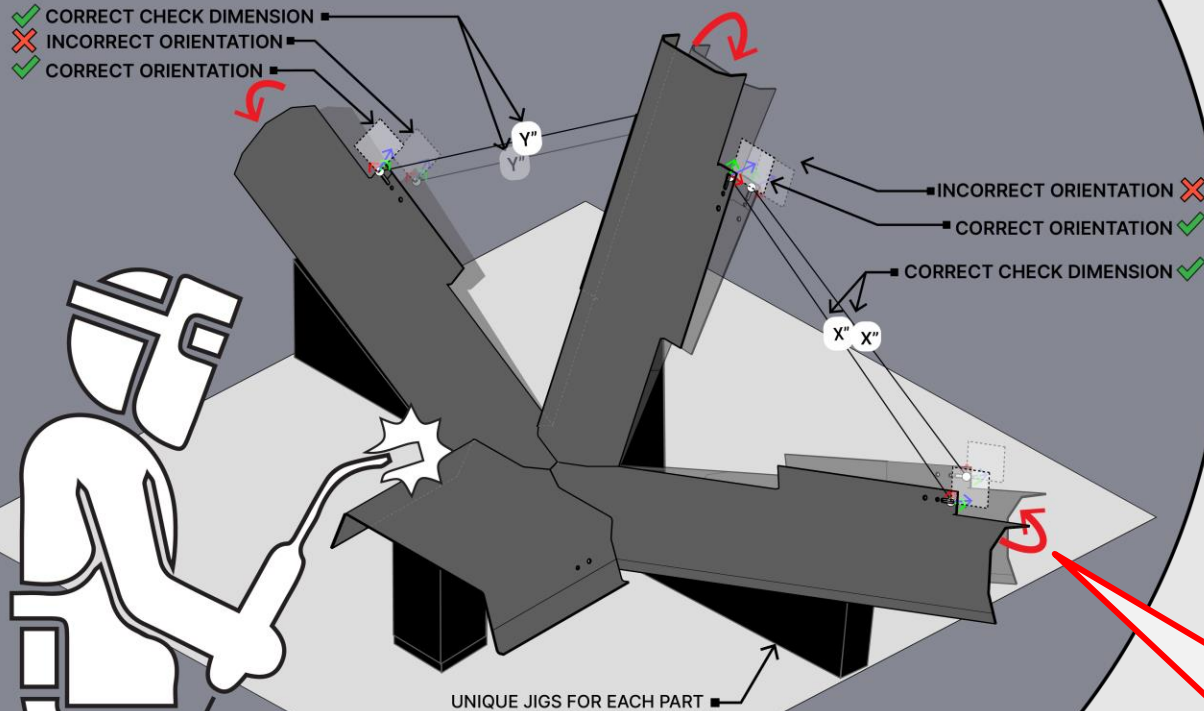
**ROBOT ASSISTED
WELDING**



JIGS & DIRECTIVES FOR ALL UNIQUE PARTS!

WORKS FOR 2D HUBS

INITIAL ASSEMBLY CONCEPT



RISK OF REWORK

CORRECT CHECK DIMENSION, INCORRECT ORIENTATION!



**NO JIGS!
NO INTERPRETATION!
NO REWORKS!**

ROBOT-ASSISTED WELDING

✓ CORRECT CHECK DIMENSION
✓ CORRECT ORIENTATION

*ROBOT ASSISTED POSITIONING

Y"

■ CORRECT ORIENTATION ✓

■ CORRECT CHECK DIMENSION ✓

X"

**PRECISE AND
REPEATABLE
POSITIONING OF
THE ROBOT**

**WELDING EXPERTISE OF
THE WORKFORCE**

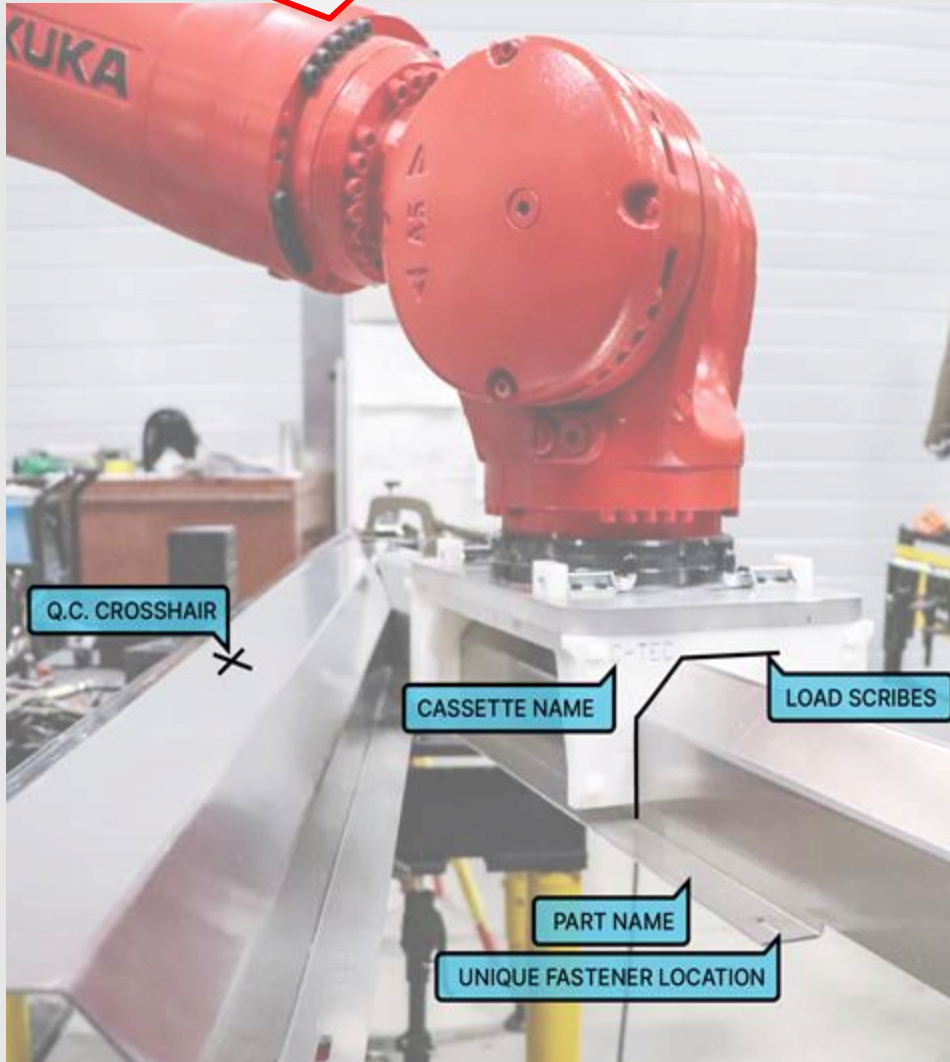
Robot Programming

**Universal Work-holding
Development**

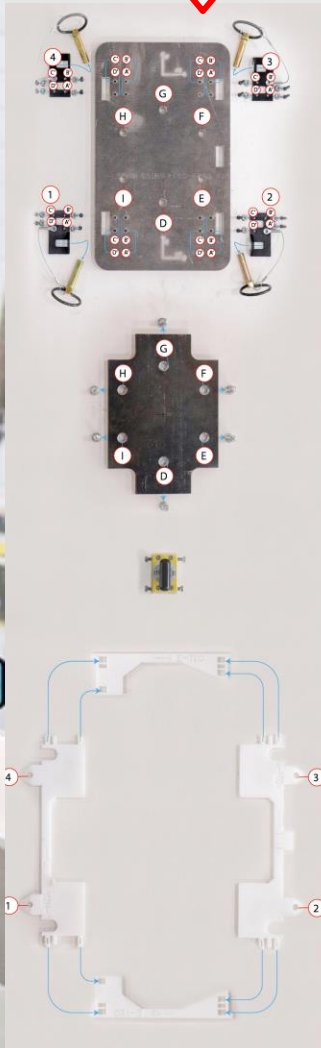
**Embedded Directives to
Program**



EXTENSION OF POSITION INTO PHYSICAL SPACE



POSITIONING TOOL



EMBEDDED DIRECTIVES INTO ROBOT PROGRAM

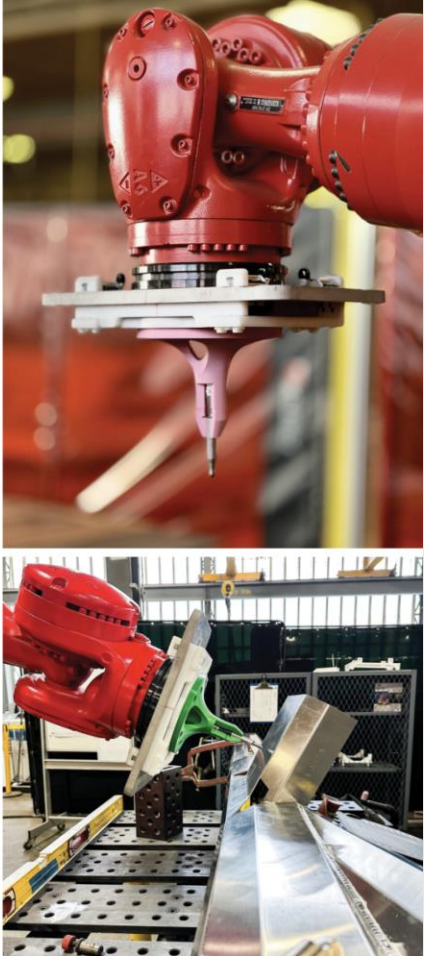
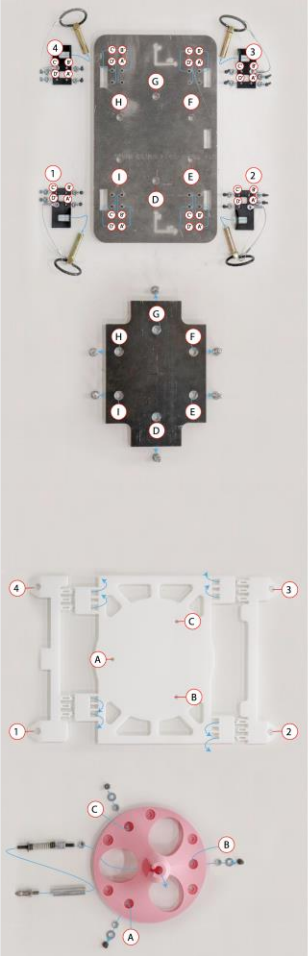


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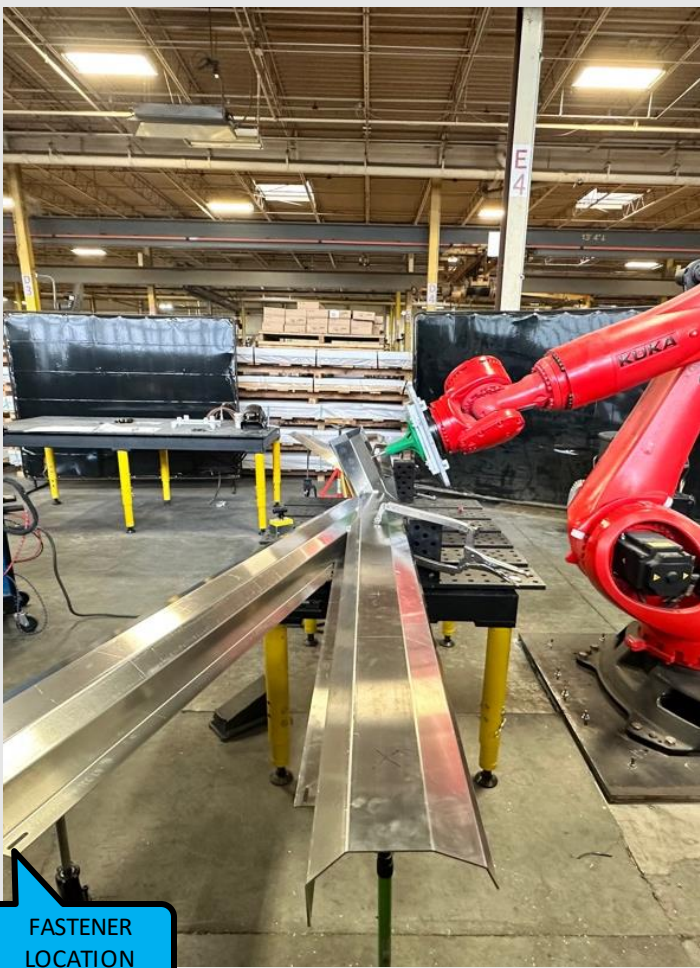
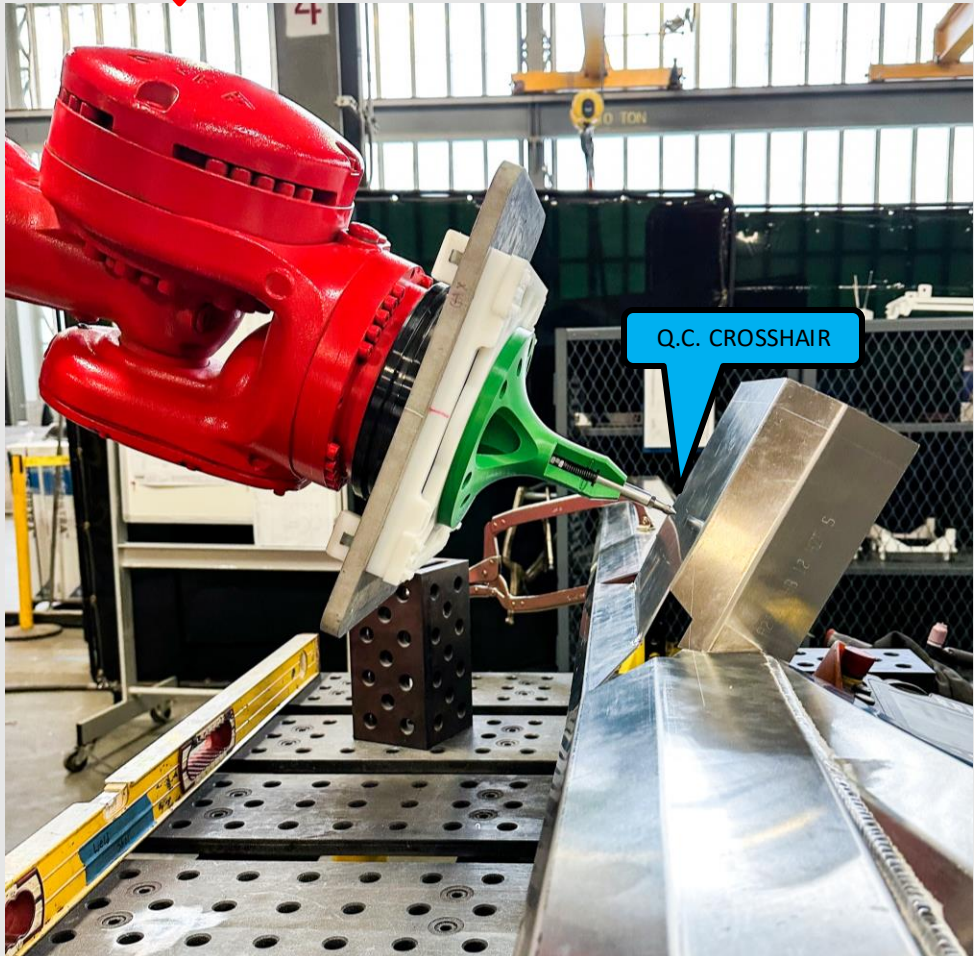
;THIS IS MB01 . BASE PROFILE AND CASSETTE NAME ARE HZH
AND G . PART NAMES IN ORDER AND CASSETTE NAME ARE
TEE_N, TEE_S AND G . EXPORT TIME: Feb,1st 2024 (14:45:16)
;INSERT TOOL G
PTP {X 486.4, Y 279.4, Z 685.486, A -90, B 0, C 180, E1 0, E2 0,
E3 0, E4 0, S 'B 110'} C_PTP
LIN {X 486.4, Y 279.4, Z 207.486, A -90, B 0, C 180, E1 0, E2 0,
E3 0, E4 0} C_DIS
;SET BLOCK UNDER THE PART ELEVATION MEASURES : 8 "
FROM TOP OF TABLE. SLIDE HZH
LIN {X 486.4, Y 279.4, Z 205.486, A -90, B 0, C 180, E1 0, E2 0,
E3 0, E4 0} C_DIS
;ALGIN SCRIBES TO CASSETTE AND SECURE BASE PROFILE
WITH CLAMPS,
LIN {X 486.4, Y 279.4, Z 685.486, A -90, B 0, C 180, E1 0, E2 0,
E3 0, E4 0} C_DIS
;INSERT TOOL G
;NEXT IS APPROACH POSITION.
LIN {X 1914.16, Y 248.958, Z 976.14, A 82.851, B -2.092, C
163.687, E1 0, E2 0, E3 0, E4 0} C_DIS
;NEXT IS WELD POSITION. LOAD THE HUB PART, SECURE WITH
MAGNET AND TAC WELD THE HUB PART. SEE WELD
DIRECTIVES.
;LOAD TEE_N
LIN {X 2013.23, Y 248.888, Z 640.454, A 82.851, B -2.092, C
163.687, E1 0, E2 0, E3 0, E4 0} C_DIS
WAIT SEC 1
;NEXT IS RETRACT POSITION. PLEASE REMOVE THE MAGNET
AND SECURE THE HUB PART WITH CLAMPS AND BLOCKS.
LIN {X 1915.414, Y 671.355, Z 976.421, A -83.209, B -2.011, C -
163.677, E1 0, E2 0, E3 0, E4 0} C_DIS
;WELD PROGRAM IS COMPLETE, PROCEED TO Q.C.
END
    
```



Q.C. TOOL



QUALITY CONTROL



**MATERIAL
CERTIFICATION**

**WELD Q.C.
SHEET**

**CRATE FINAL
QC**

ITEM DESCRIPTION
.090" X 60" 5052-H32 ALUM COIL Country of Mfg.: U.S.A.

SPECIFICATIONS
ASTM B209-14, AMS 4016M, AMS QQ A250/8

MECHANICAL PROPERTIES

	RESULTS		Standard			RESULTS		Standard	
	Min	Max	Min	Max		Min	Max		
Elongation(%)	11	7.0			Tensile Strength,KSI	33.5	31.0	38.0	
					Yield Strength,KSI	26.1	23.0		

CHEMICAL COMPOSITION

	RESULTS		Standard			RESULTS		Standard	
	Min	Max	Min	Max		Min	Max		
Silicon (Si)	0.170	0.250	Iron (Fe)	0.280	0.400				
Copper (Cu)	0.058	0.100	Manganese (Mn)	0.058	0.100				
Chromium (Cr)	0.187	0.350	Magnesium (Mg)	2.490	2.200	2.800			
Zinc (Zn)	0.016	0.100	Others, Total	0.060	0.150				
Aluminum (Al)	96.741	Remainder	Other, Each		0.050				

Chemical Composition

	AWS Requirements
Silicon (Si)	0.25 max.
Iron (Fe)	0.40 max.
Copper (Cu)	0.10 max.
Manganese (Mn)	0.05-0.20
Magnesium (Mg)	4.5-5.5
Chromium (Cr)	0.05-0.20
Zirconium	
Zinc (Zn)	0.10 max.
Titanium (Ti)	0.06-0.20
Beryllium (Be)	0.0008 max.
Aluminum (Al)	Remainder

HZK_CLIP Diagram

HZK_CLIP, HZK_CLIP, WELD HZK_CLIP 3" FROM INNER SCRIBE LINE, TEC, 1/8" 1/2" MIN., LEU_CAP, LEO, E356, EACH END OF BENT PLATE FLANGE TYP.

Post-Weld Q.C.

LOCATION	ACCEPTABLE TOLERANCE *** (CIRCLE ONE)	INITIALS	PASS / FAIL
C.P. 1	+/- .375 / .125		
C.P. 2	+/- .375 / .125		
C.P. 3	+/- .375 / .125		
C.P. 4	+/- .375 / .125		
C.P. 5	+/- .375 / .125		

TABLE 1: ANGLES B/W PARTS COMPLETION INITIALS DATE

	COMPLETION	INITIALS	DATE
Any Angle Between Welded Hub Parts < 30°	Y / N		
Utilized Acute Miter Directive	Y / N / N/A		
LEU Cap, HZK_CLIP Welded	Y / N / N/A		

TABLE 2: FINISHING PROCESS COMPLETION INITIALS DATE

	COMPLETION	INITIALS	DATE
Sealant Area Ground SMOOTH	Y / N		
Weld Penetrant Test	PASS / FAIL		
Welder ID Added to Part	Y / N		

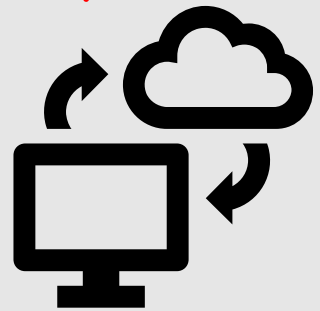
Recorded by: _____ (Initials)

1-TYP. Q.C. APPROACH POINT
2-**TYP. Q.C. CHECK POINT(C.P.)

Weather-Resistant Hubs - Fabrication QC Checklist

Quality Control Checks	Pass/Fail	Notes
Assembly Name		
Crate Number		
Dimension Checks		
Angle Checks (where applicable)		
Weld Penetrant Test		
Initials (Reference Legend)		
Date		

**QC PACKAGE
SHARED WITH
EXTERNAL
STAKEHOLDERS**









PDF REPORTS



Typical Survey Report



PNEZD:
NORTHING, EASTING, ELEVATION

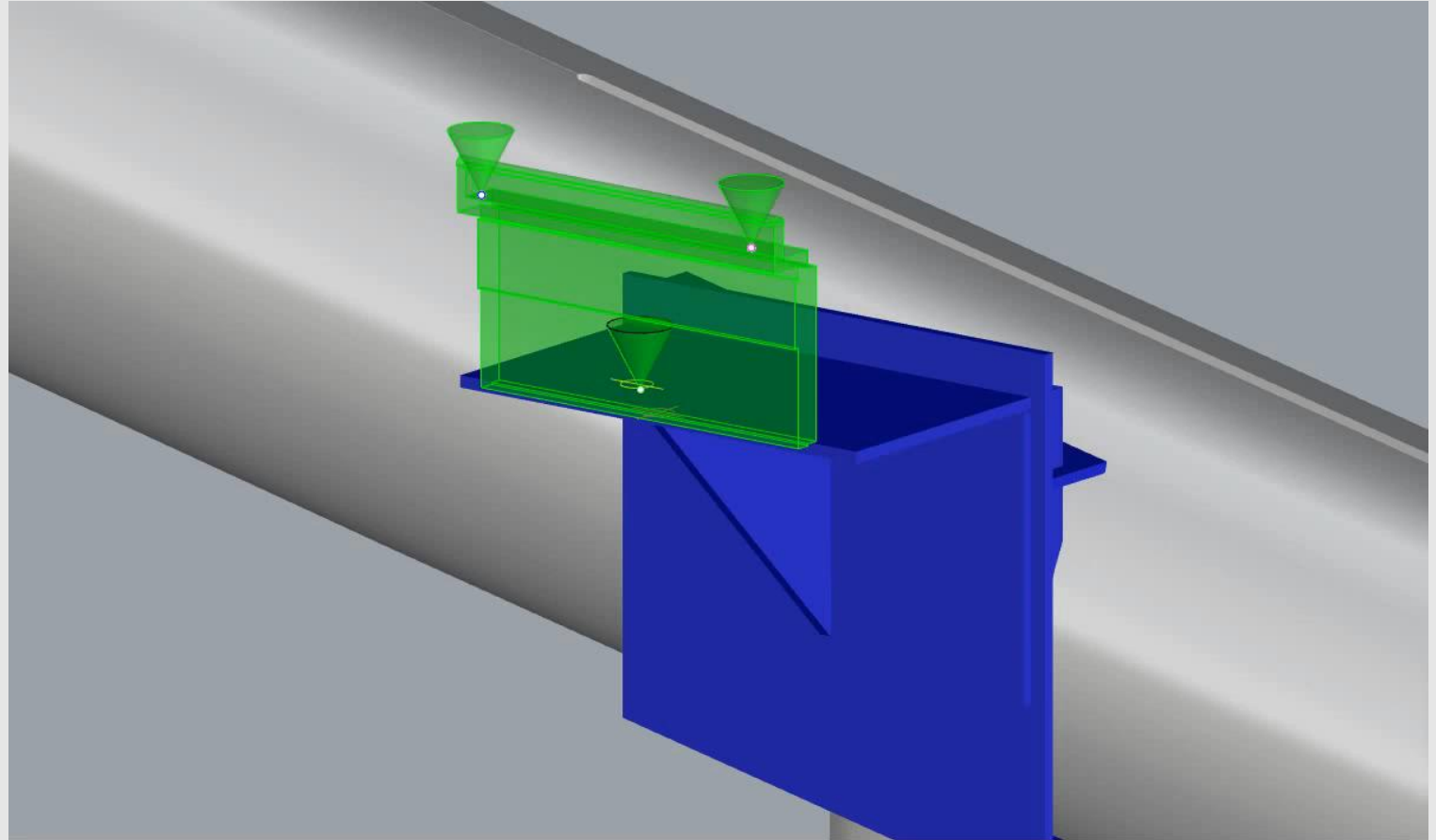
X - Y - Z

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34000,309.4987,163.2704,76.0748,6W-2-1
34001,308.8823,162.6604,76.0577,6W-2-2
34002,305.4685,159.2422,74.6789,6W-3-1
34003,304.8561,158.6301,74.6697,6W-3-2
34004,301.4609,155.2270,73.3775,6W-4-1
34005,300.8377,154.6152,73.3891,6W-4-2
34006,297.4855,151.2498,72.1657,6W-5-1
34007,296.8718,150.6335,72.1560,6W-5-2
34008,293.5157,147.2842,71.0767,6W-6-1
34009,292.9024,146.6694,71.0951,6W-6-2
34010,289.4929,143.2695,69.9054,6W-7-1
34011,288.8846,142.6519,69.9130,6W-7-2
34012,285.4578,139.2176,68.7868,6W-8-1
34013,284.8356,138.6075,68.7863,6W-8-2
34014,281.5082,135.2657,67.8997,6W-9-1
34015,280.7952,134.7503,67.8924,6W-9-2

Survey Data Raw

Automated Survey Analysis

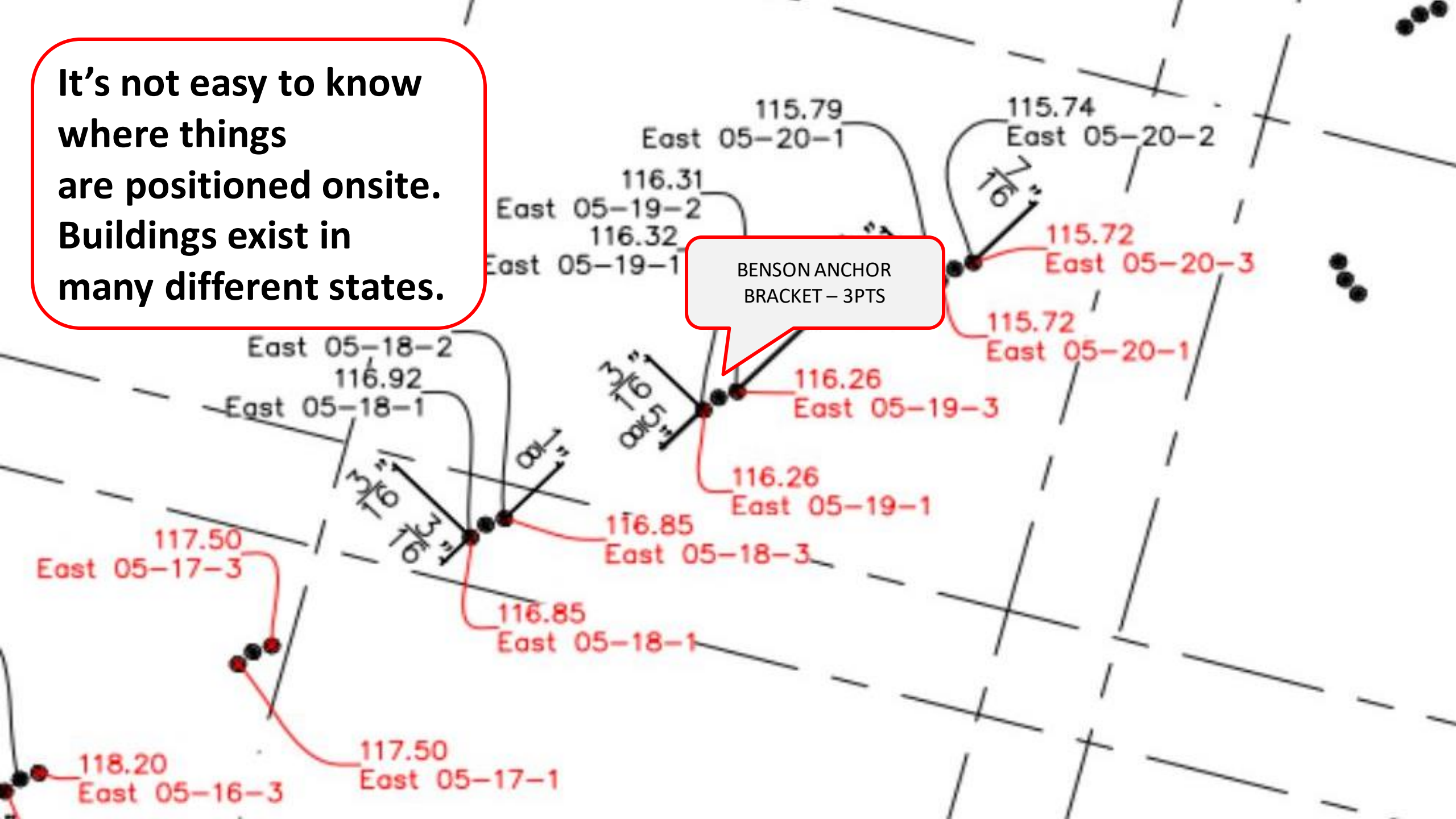
AUTOMATED SURVEY ANALYSIS



Automated as-built comparison



It's not easy to know where things are positioned onsite. Buildings exist in many different states.



BENSON
U1-0-05-08
UPE-005 8S

U1-0-05

U1-0-0

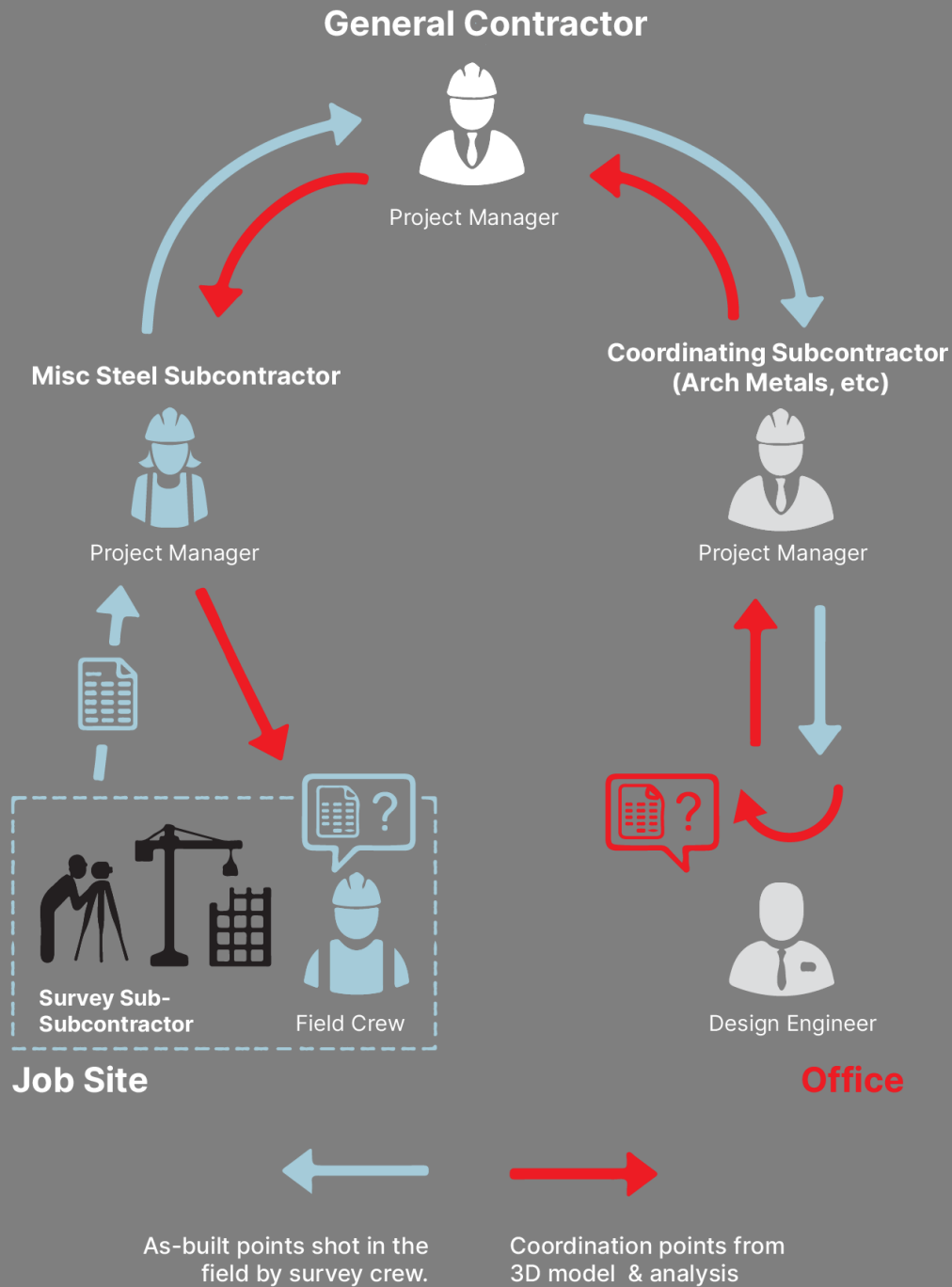
9
+ 1 7/8
+ 1 7/8



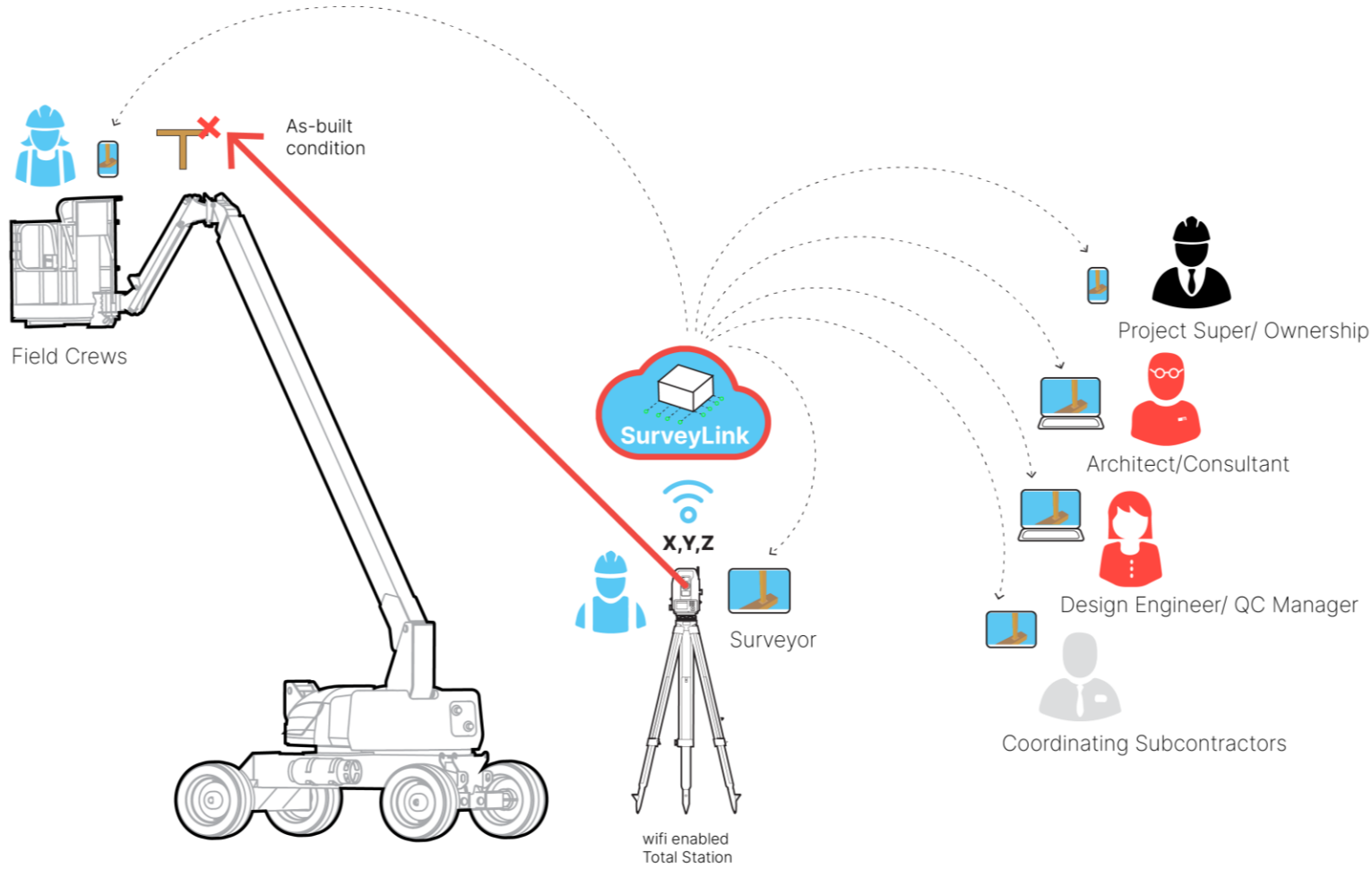


SURVEYLINK

How can we overcome costly fragmented communication between office and field?

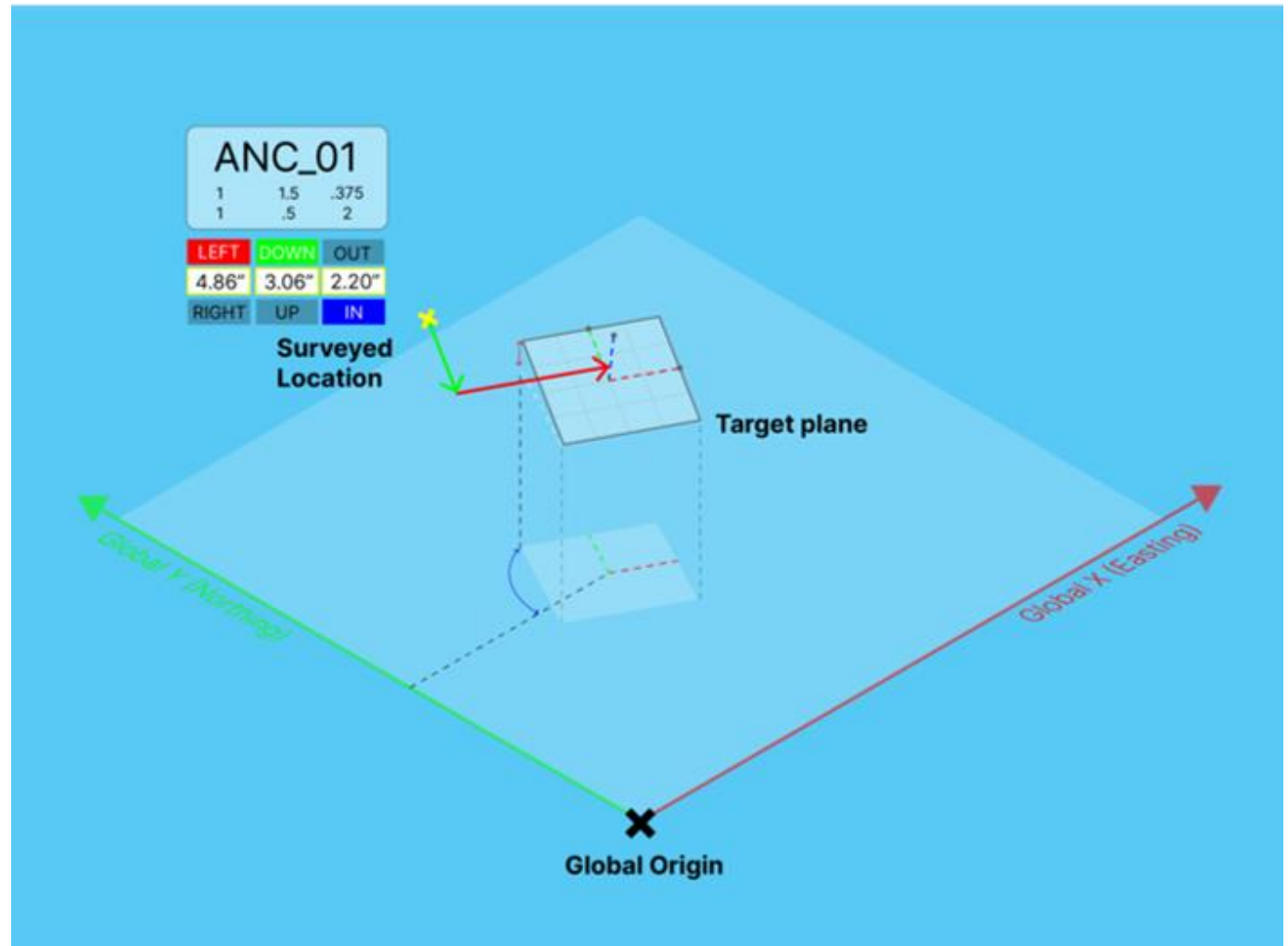
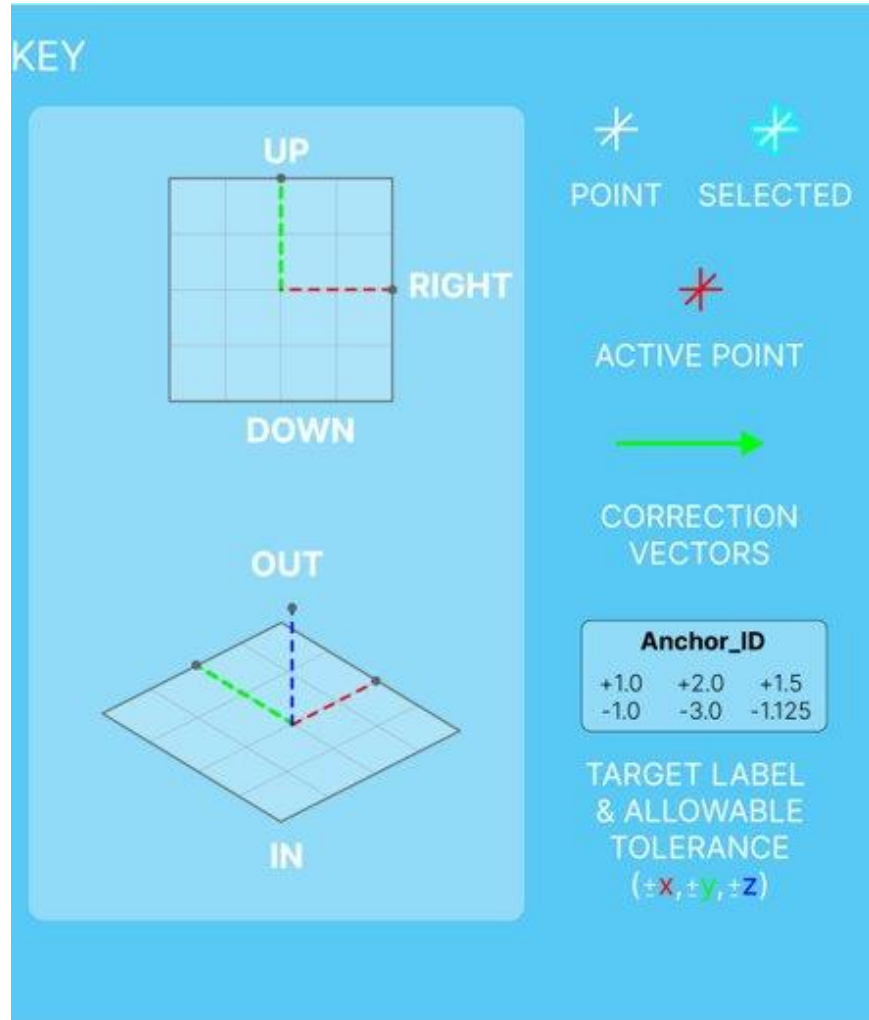


SEAMLESS COMMUNICATION

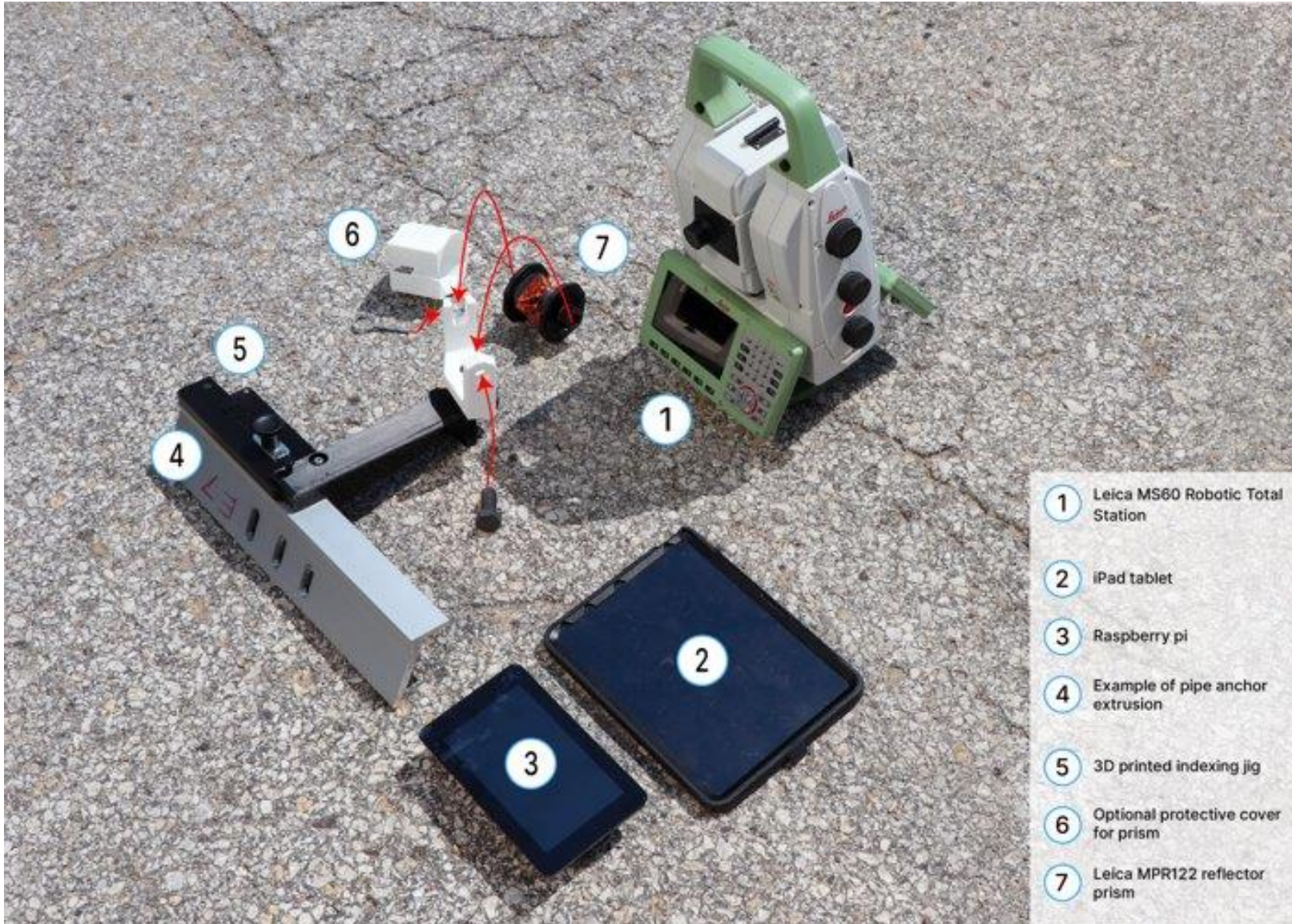


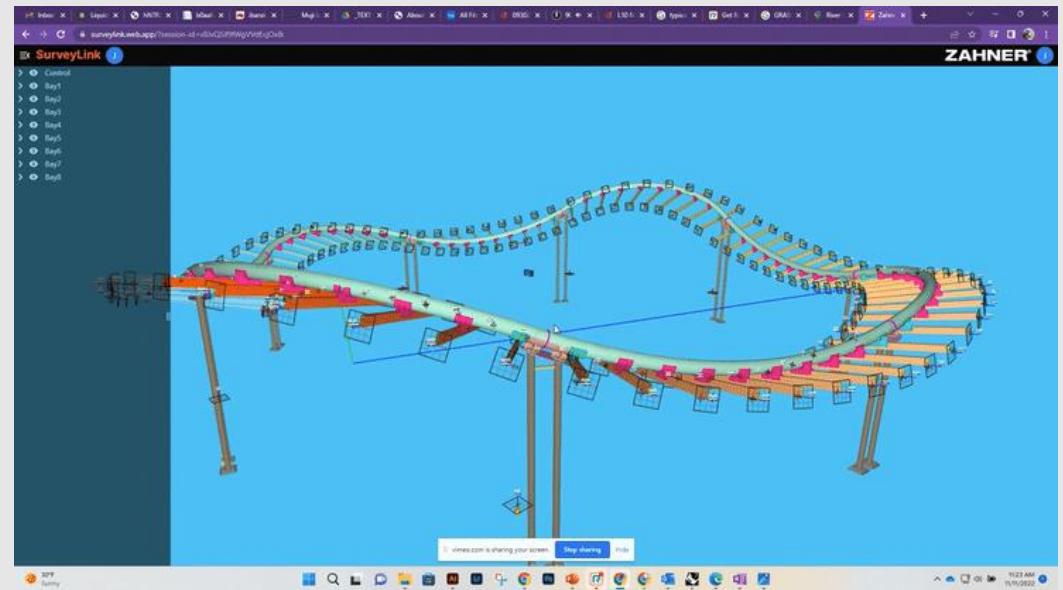
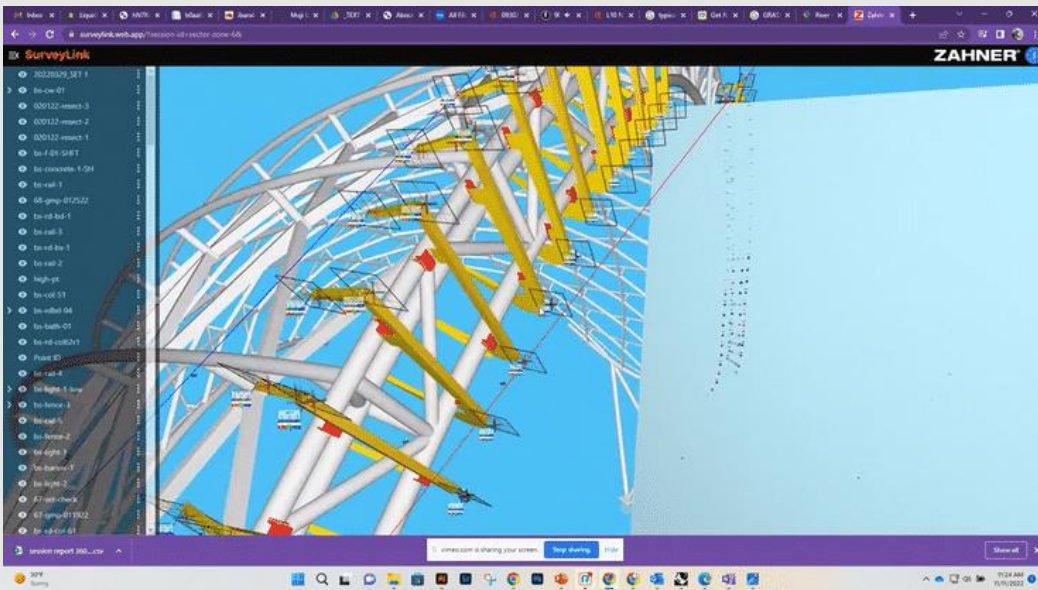
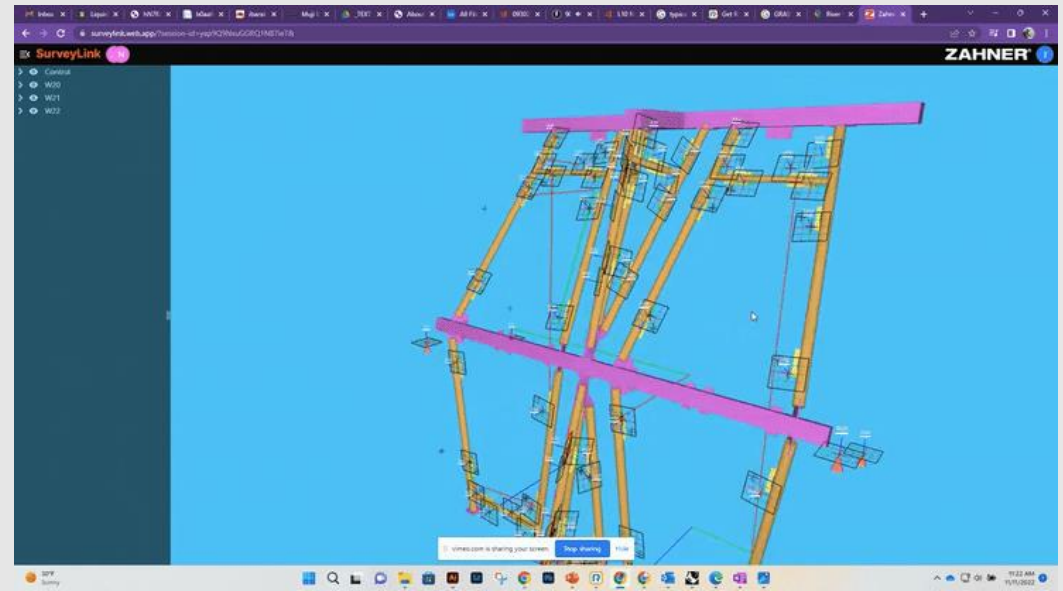
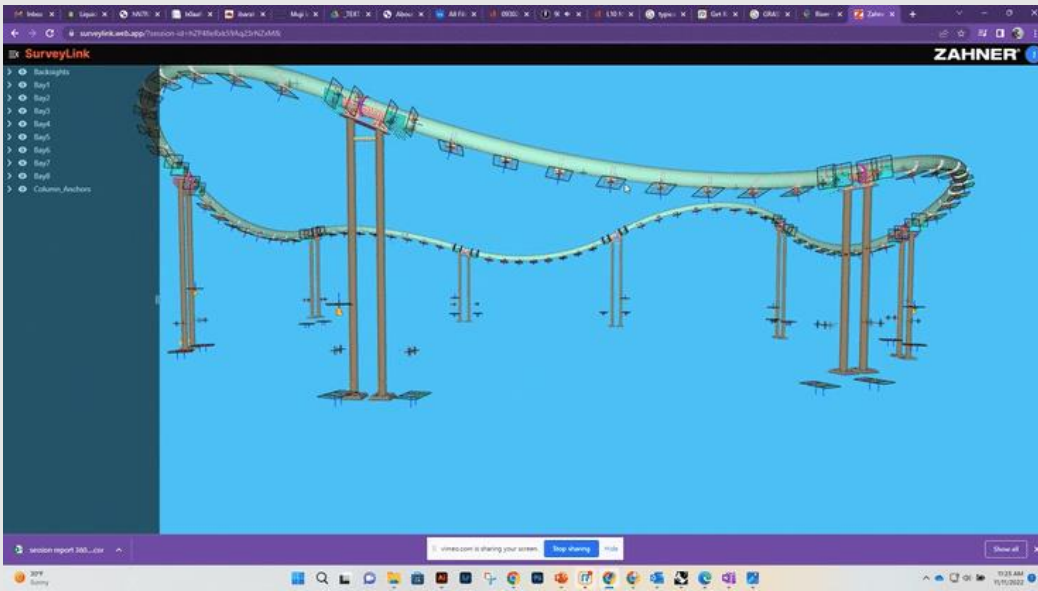
SurveyLink allows all stakeholders to see the same information –reducing opportunities for miscommunication and conflict.

LOCAL COORDINATES



KIT OF PARTS



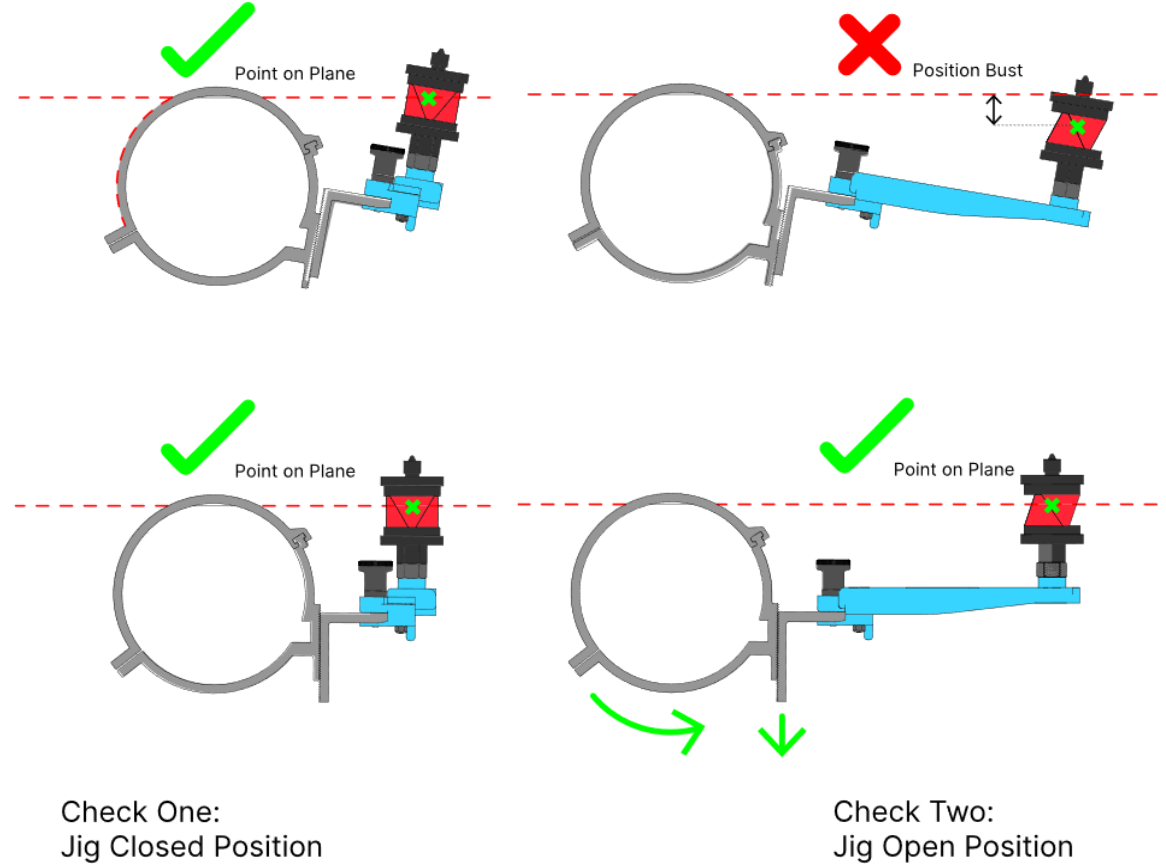
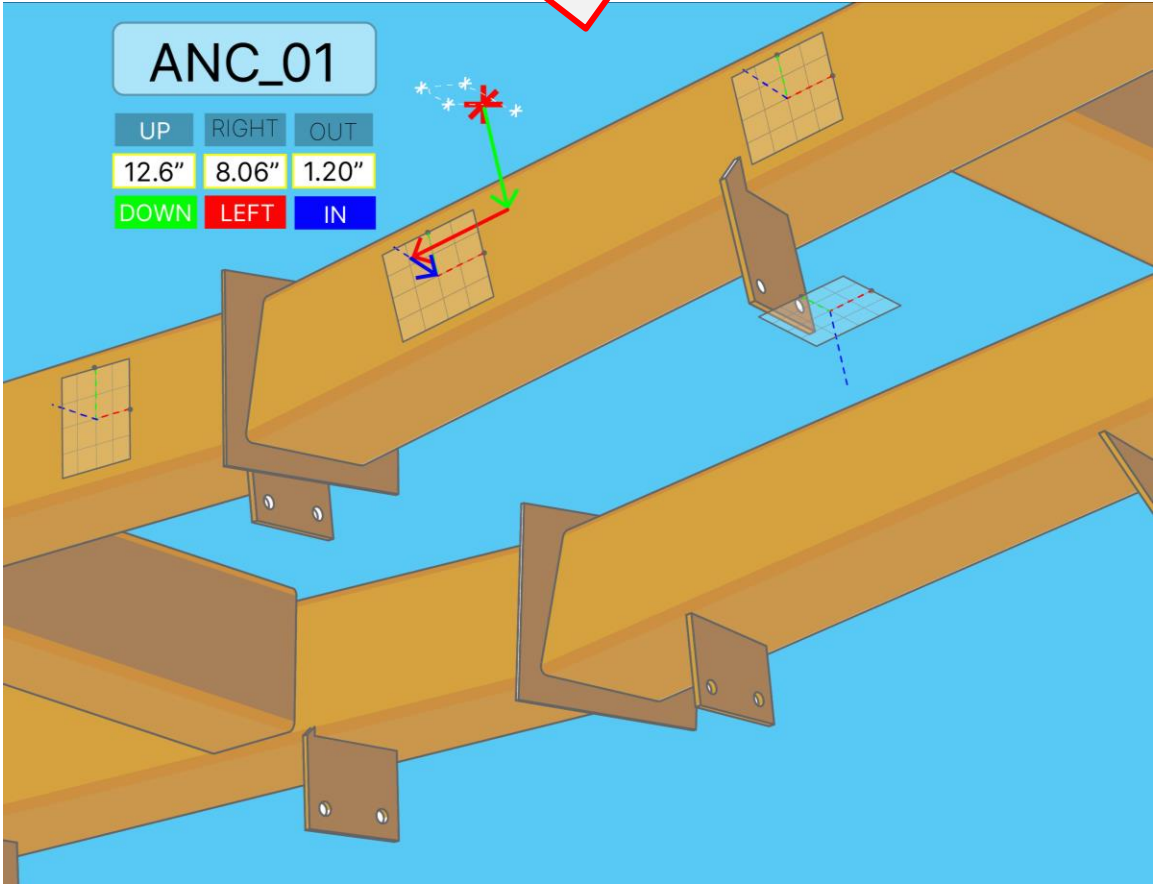


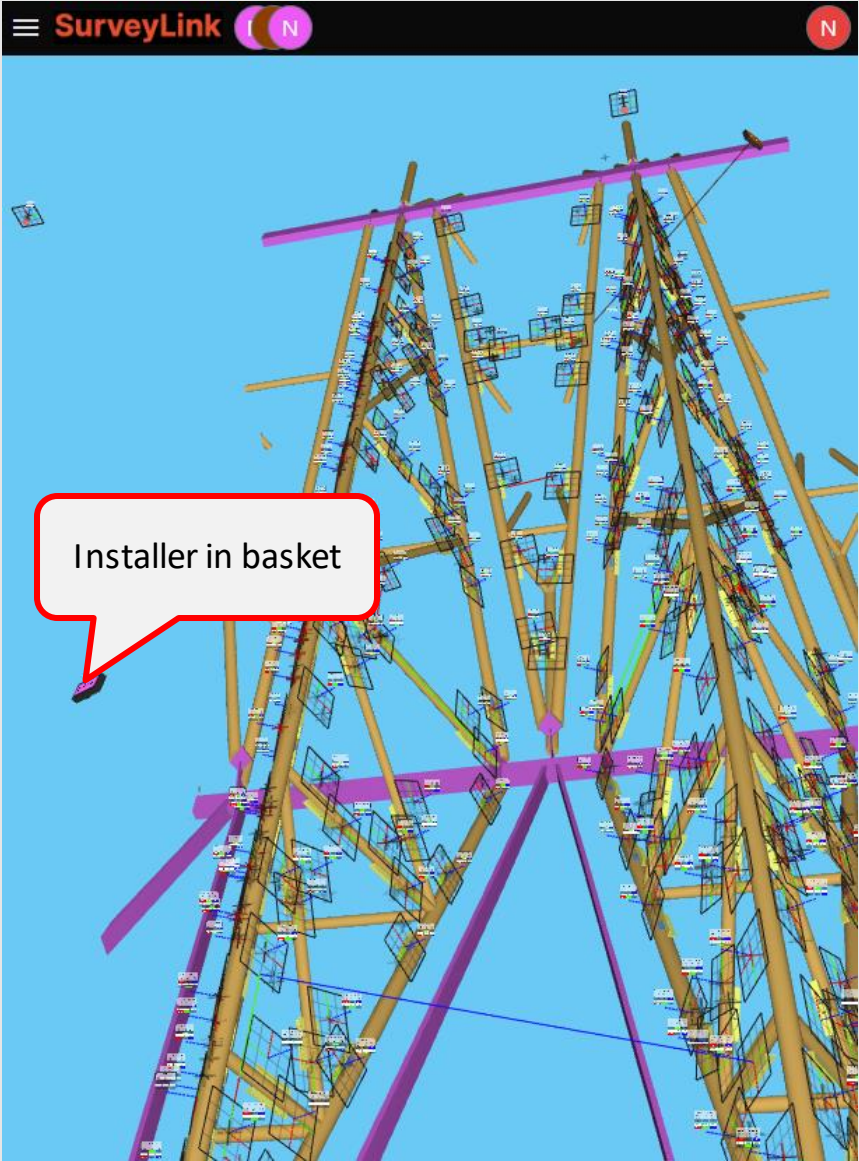
Cloud Model



REAL-TIME FEEDBACK

Real-time Feedback
in Minutes



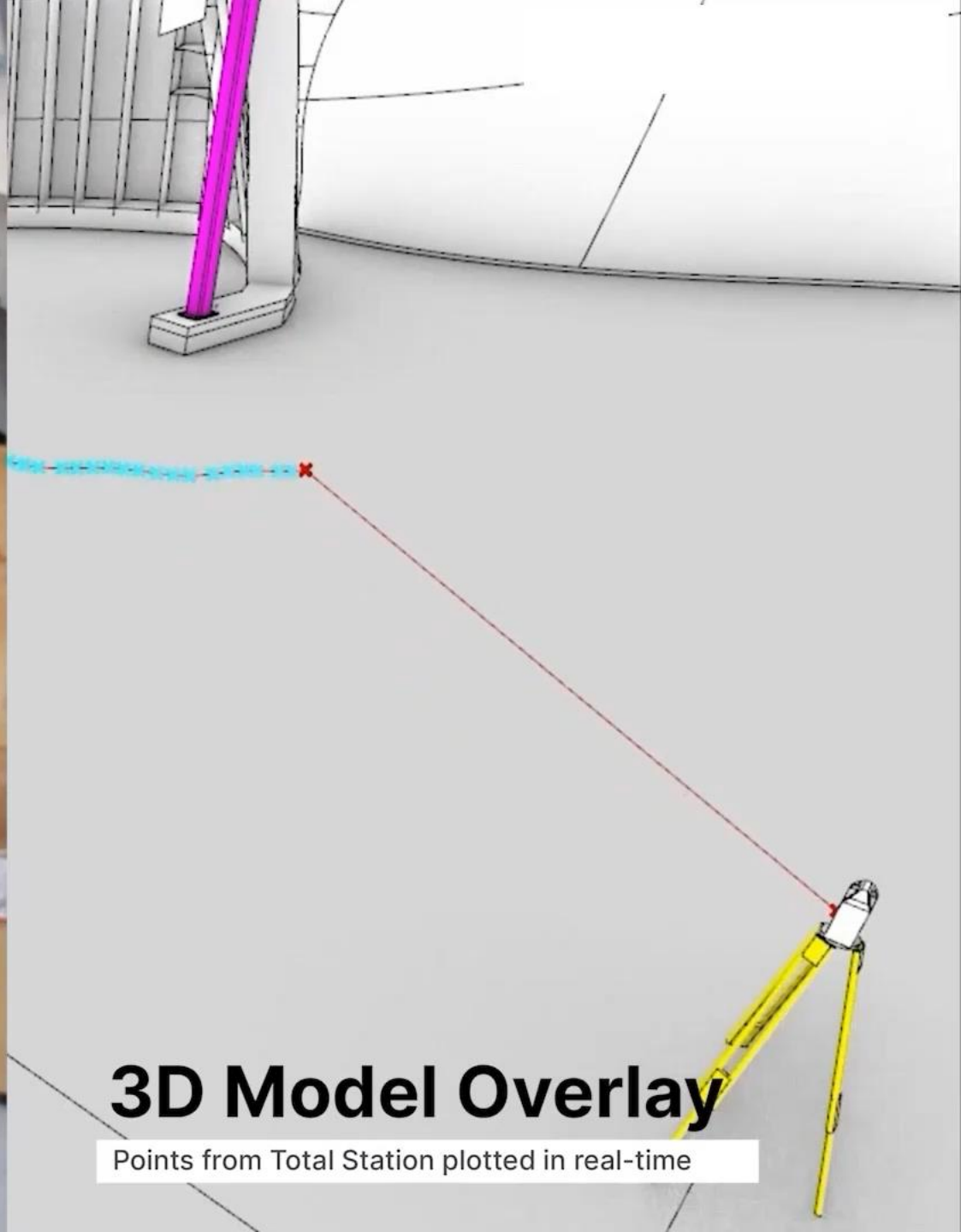


Position Streaming 10Hz



Prism Tracking

Points measured and streamed from total station



3D Model Overlay

Points from Total Station plotted in real-time



Meeting Close

- Split Kitty Drawing
- PDHs available from the Omaha Post Website
 - ▶ <https://www.same.org/omaha/resources/>